

Fig. 1

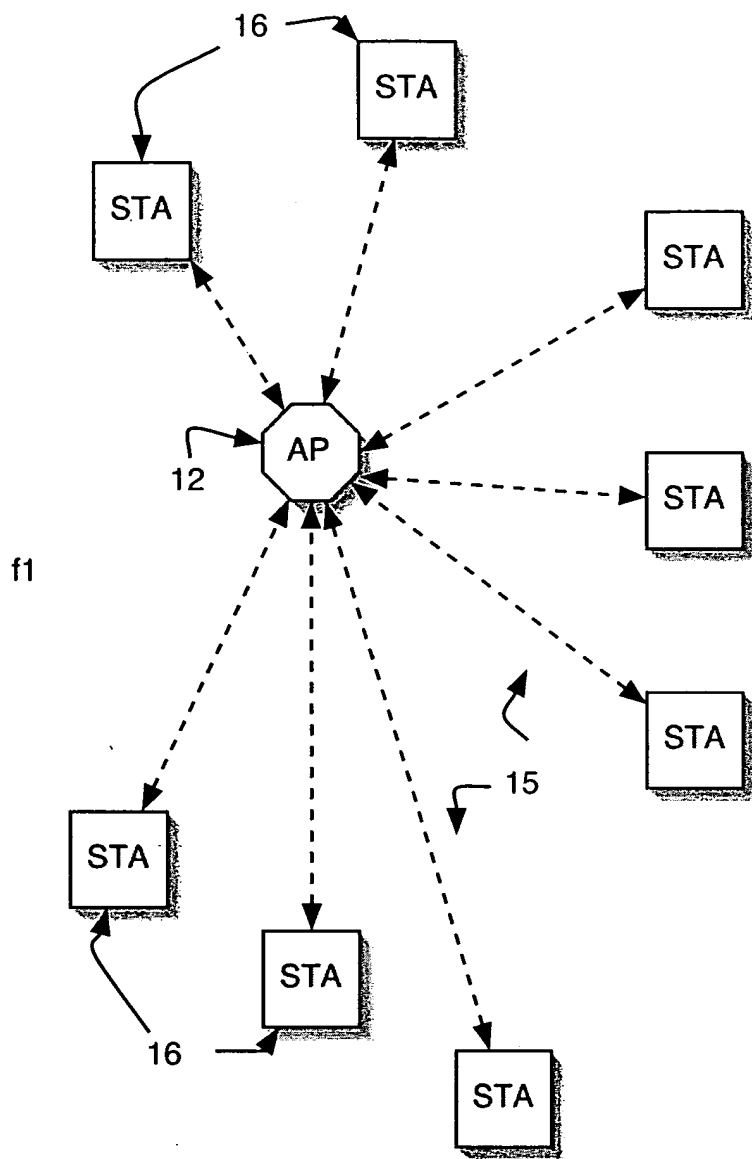


Fig. 2

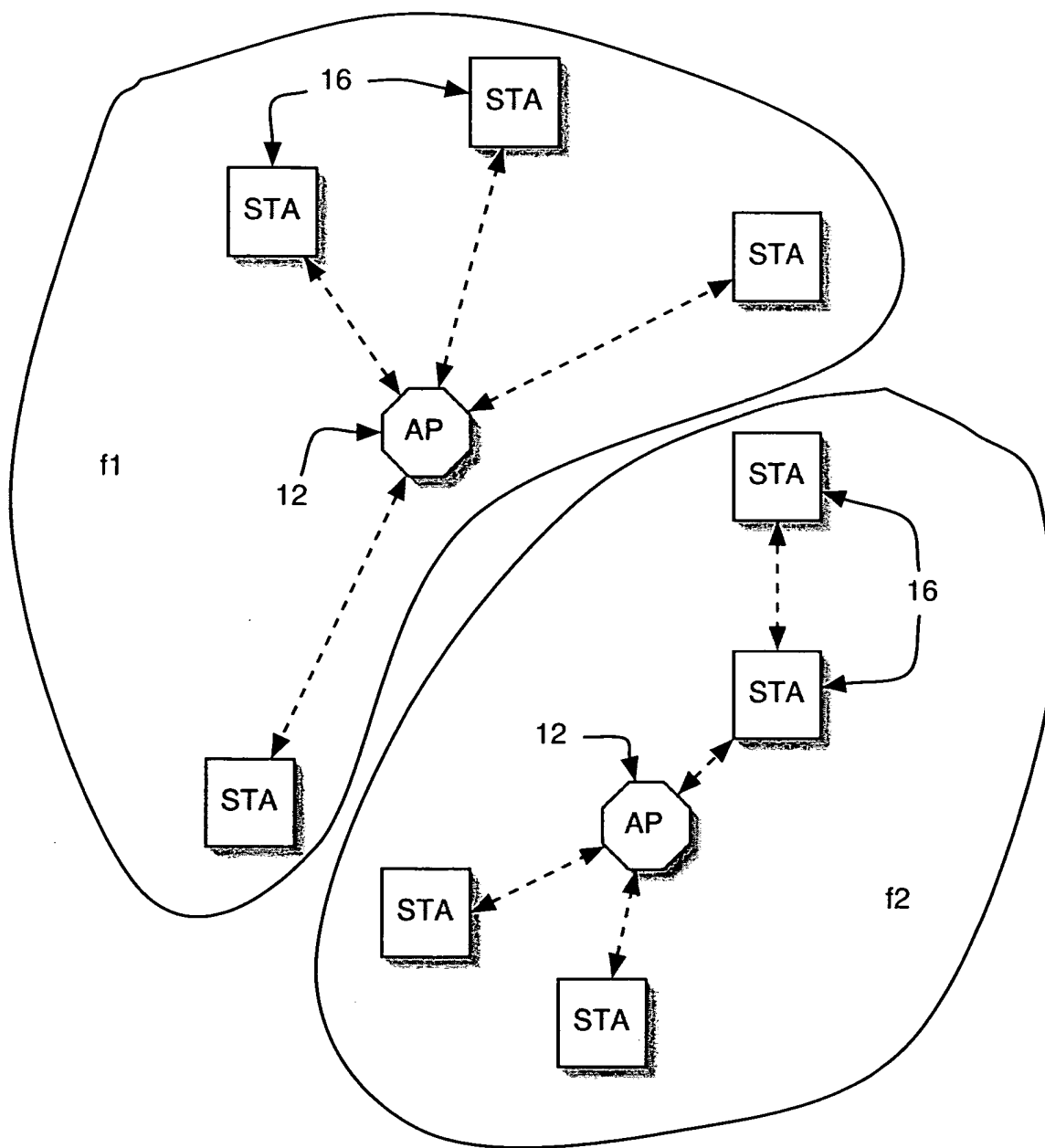


Fig. 3

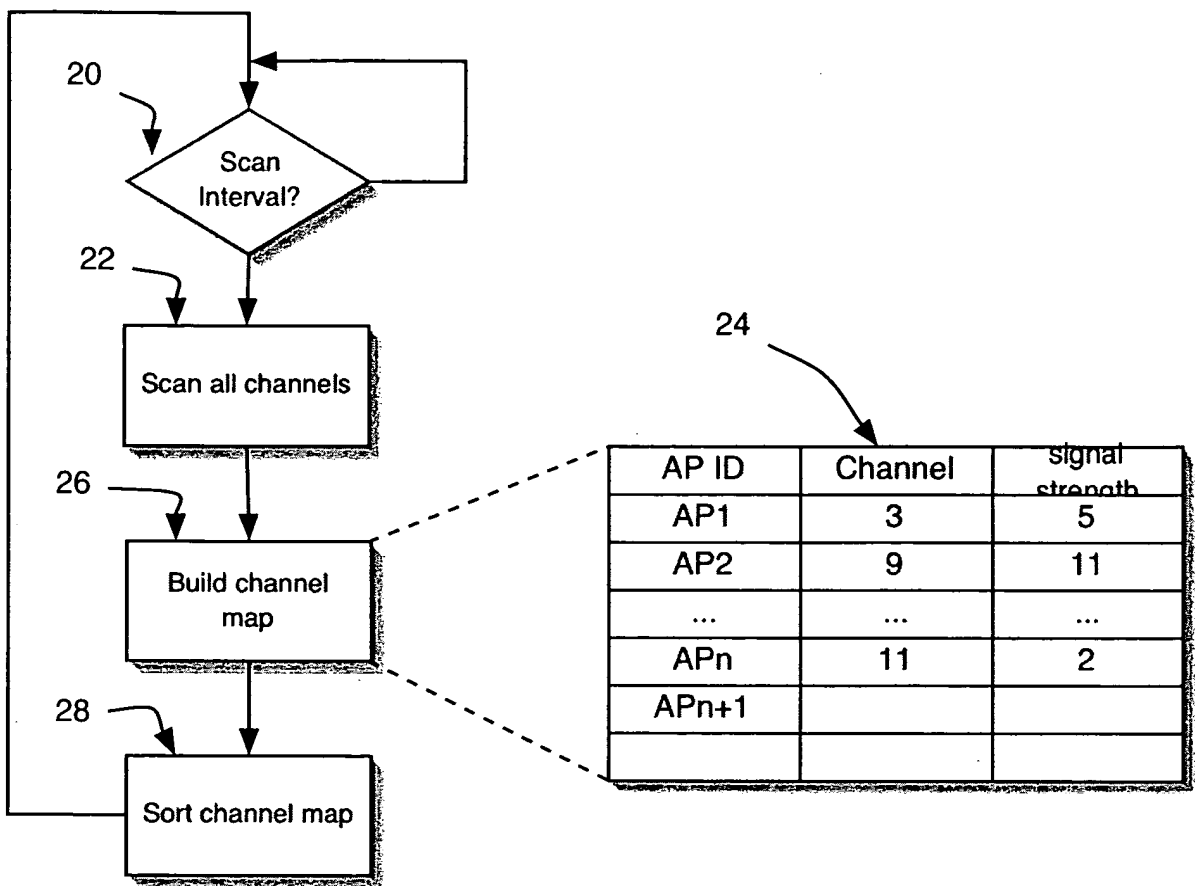


Fig. 4

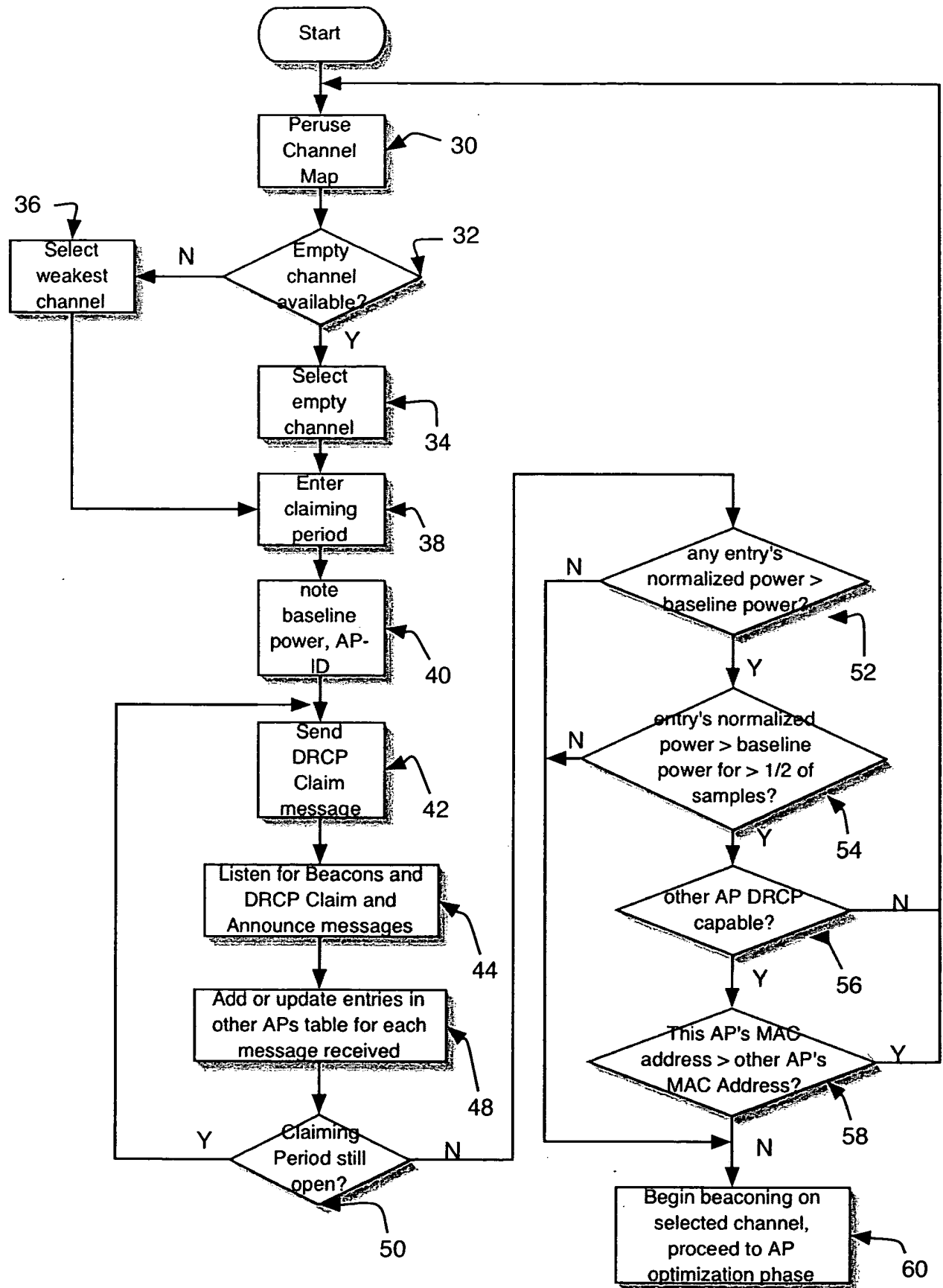


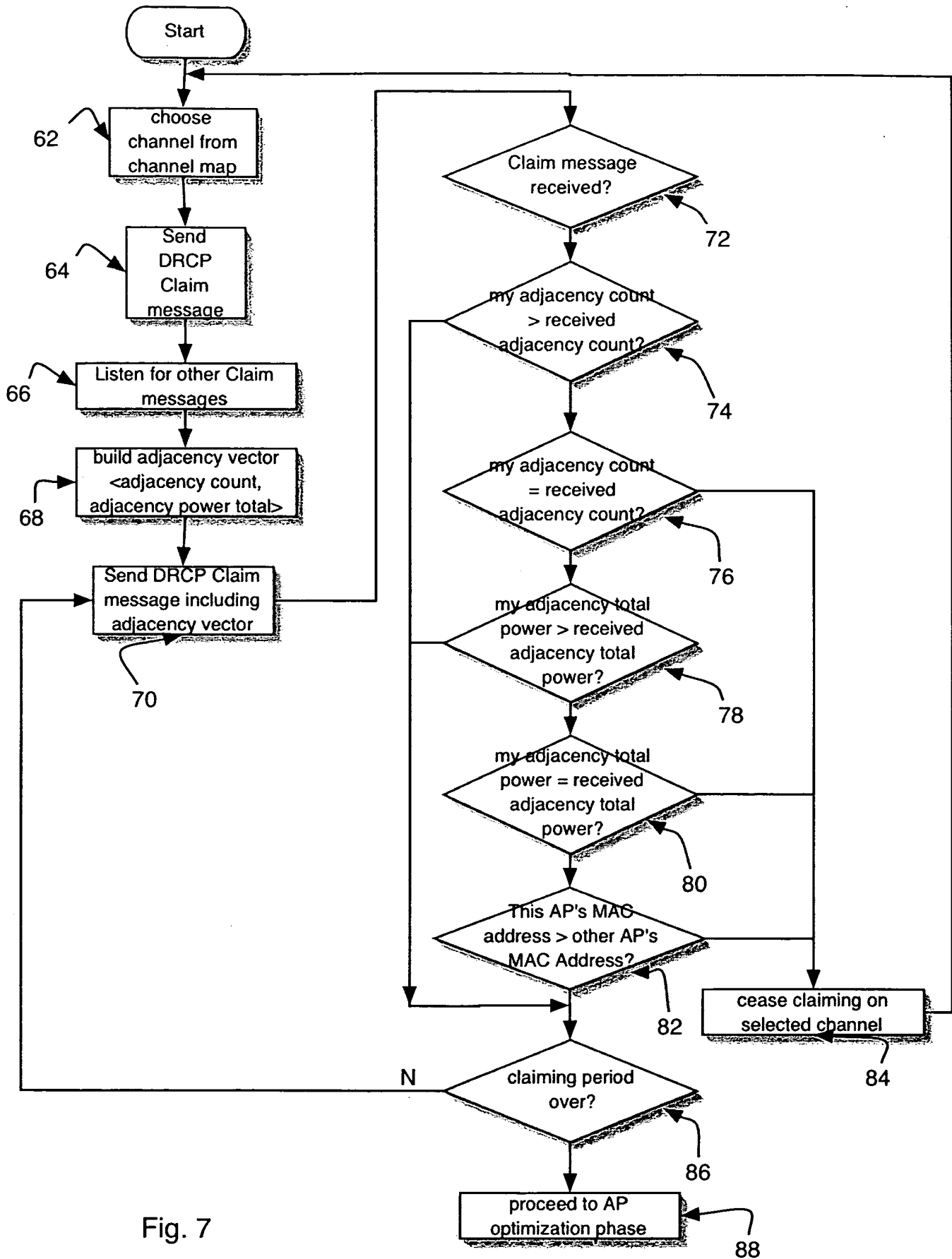
Fig. 5

46

| AP_ID | received power | TP Backoff | DRCP | Normalized received power |
|-------|----------------|------------|------|------------------------------|
| AP[1] | <list> | <list> | 1 | |
| AP[2] | 0 | ? | 0 | |
| ... | ... | ... | ... | ... |
| AP[n] | <list> | <list> | 1 | |

Other APs Table

Fig. 6



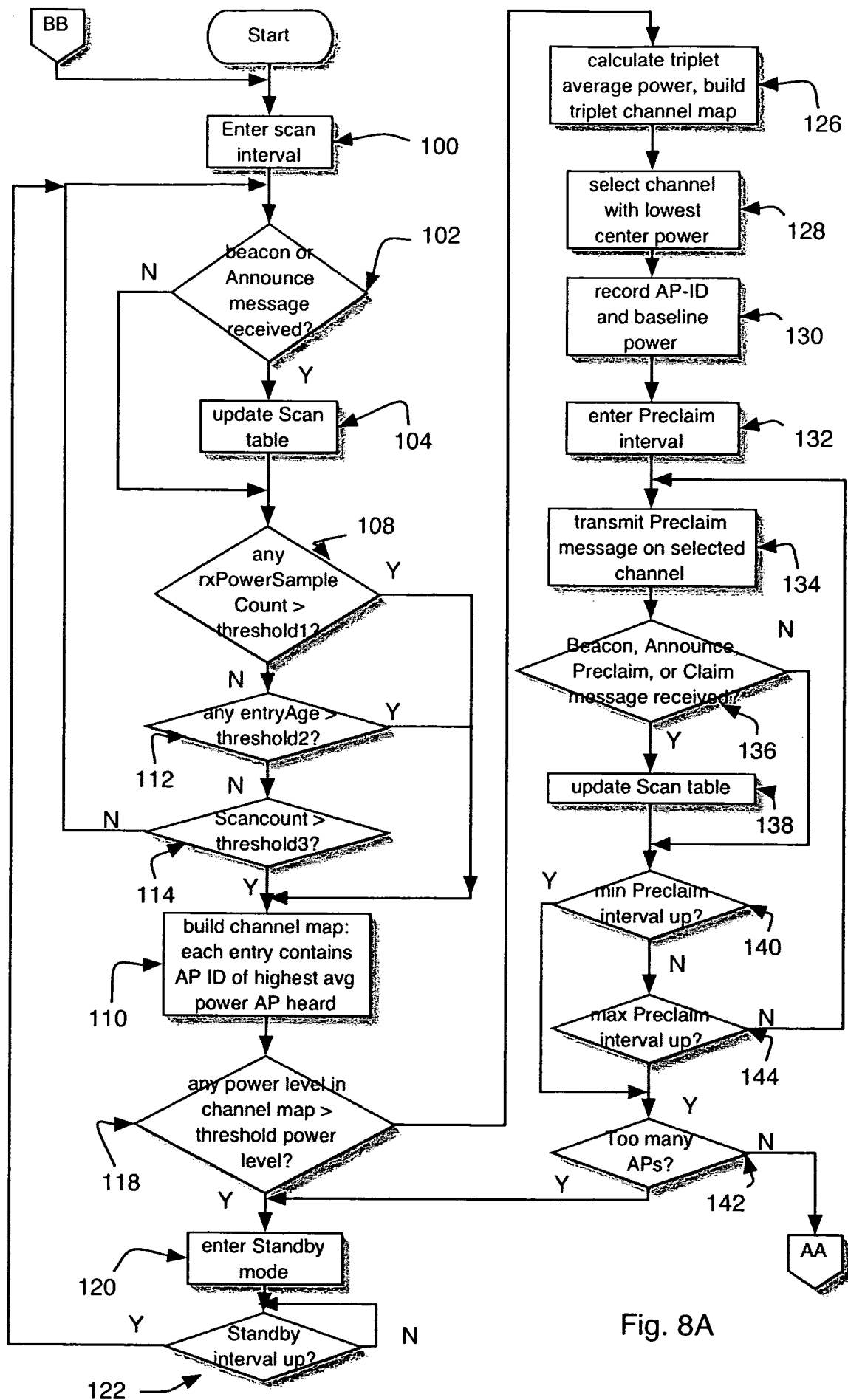
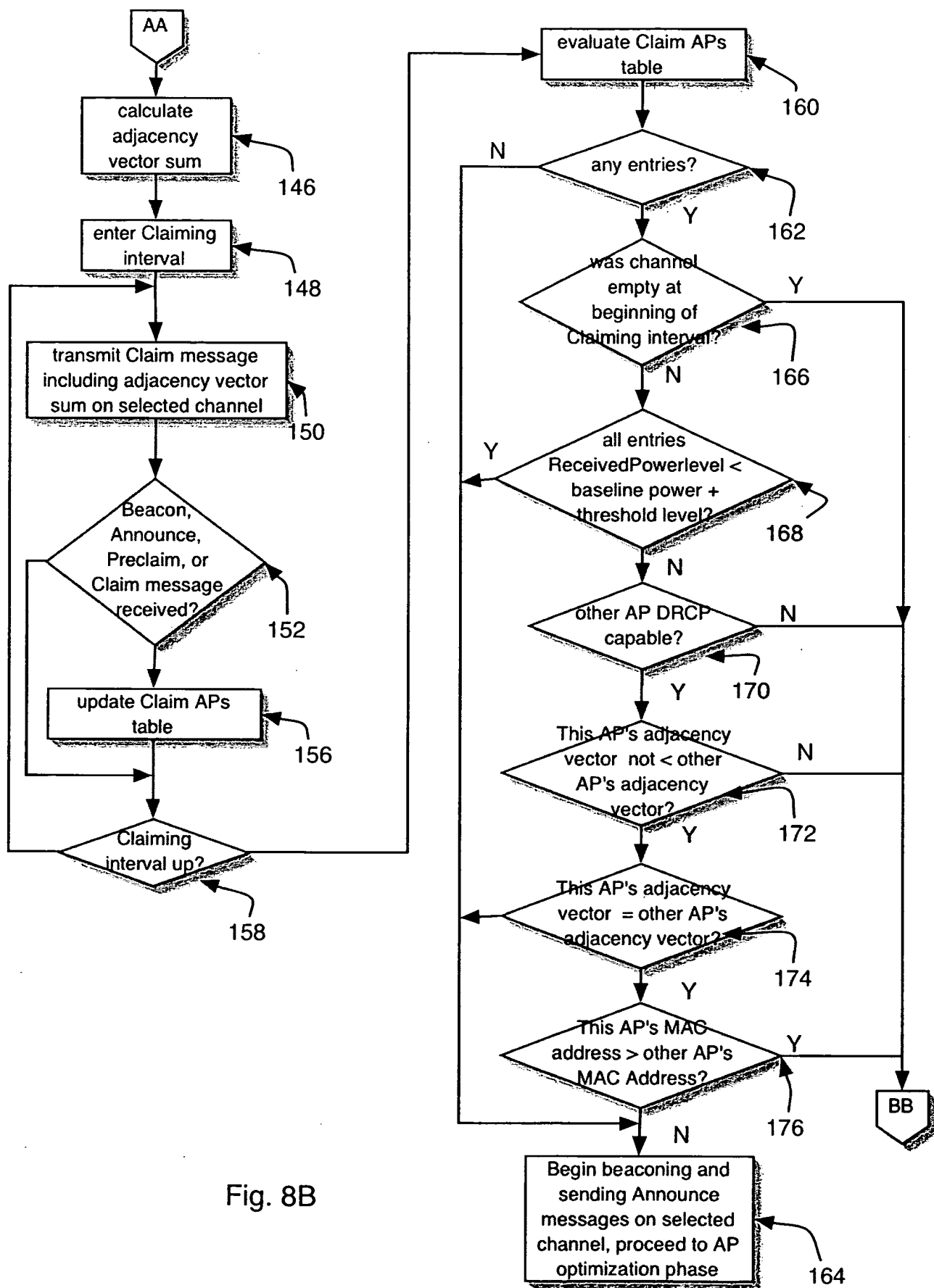



Fig. 8A



106



| AP_ID | Channel_ID | rxPowerRunning Total | rxPowerSample Count | rxPowerAvg | DRCP | Age |
|-------|------------|-------------------------|------------------------|------------|------|-----|
| AP[1] | 3 | dbm | 3 | dbm | 1 | 3 |
| AP[2] | 3 | dbm | 5 | dbm | 0 | 7 |
| ... | ... | dbm | ... | ... | ... | ... |
| AP[n] | 5 | dbm | 8 | dbm | 1 | 4 |

Scan Table

Fig. 9

116

| Channel_ ID | highestPwr AP_ID | highestPwrlevel |
|----------------|---------------------|-----------------|
| 2 | AP[1] | dbm |
| 3 | AP[2] | dbm |
| ... | ... | ... |
| 8 | AP[n] | dbm |

Channel Map

Fig. 10

124

| Channel | signal strength | Triplet avg | AP ID |
|---------|-----------------|-------------|-------|
| 2 | 5 | 5 | 3 |
| 3 | 2 | 5 | 11 |
| 4 | 8 | 5 | 2 |
| 1 | 3 | 6 | 8 |
| 2 | 9 | 6 | 6 |
| 3 | 6 | 6 | 1 |
| | | | |

Triplet channel map

Fig. 11

154

| AP-ID | ReceivedPowerlevel | DRCP |
|-------|--------------------|------|
| 2 | <list> | 5 |
| 3 | <list> | 7 |
| 4 | <list> | 3 |
| 7 | <list> | 6 |
| 9 | <list> | 9 |
| 11 | <list> | 12 |

Claim APs table

Fig. 12

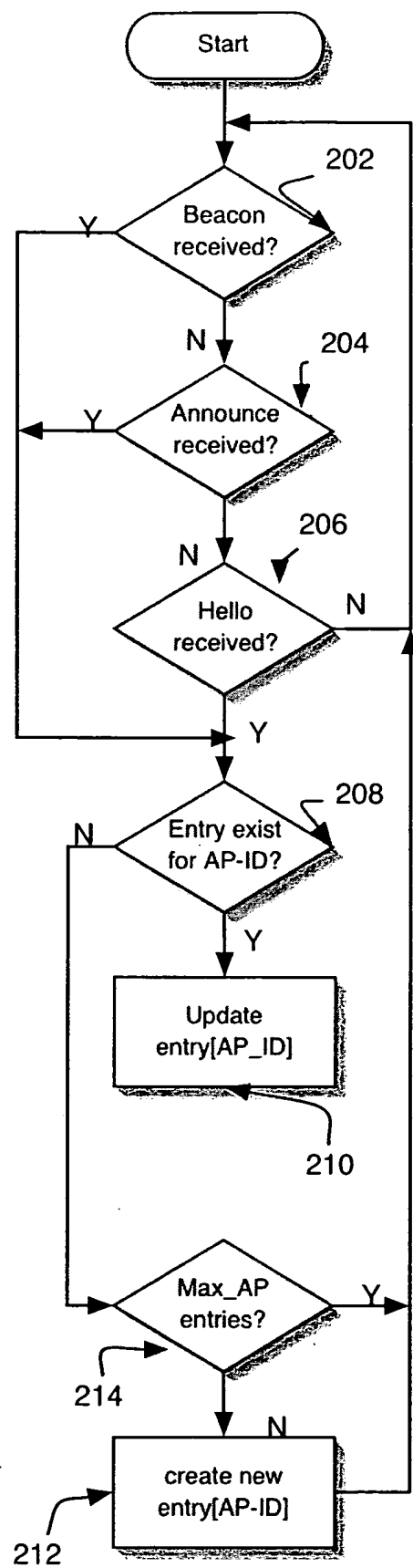
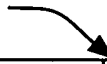


Fig. 13

200



| AP_ID | TP_Backoff | Max Power | DRCP | Age | Normalized power | sample size | corrected power |
|------------|------------|-----------|------|-----|------------------|-------------|-----------------|
| AP[1] | <list> | <list> | 1 | 2 | dbm | 3 | dbm |
| AP[2] | 0 | max power | 0 | 3 | dbm | 4 | dbm |
| ... | ... | ... | ... | ... | ... | ... | ... |
| AP[MAX_AP] | <list> | <list> | 1 | 1 | dbm | 1 | dbm |

AP Known APs Table

Fig. 14

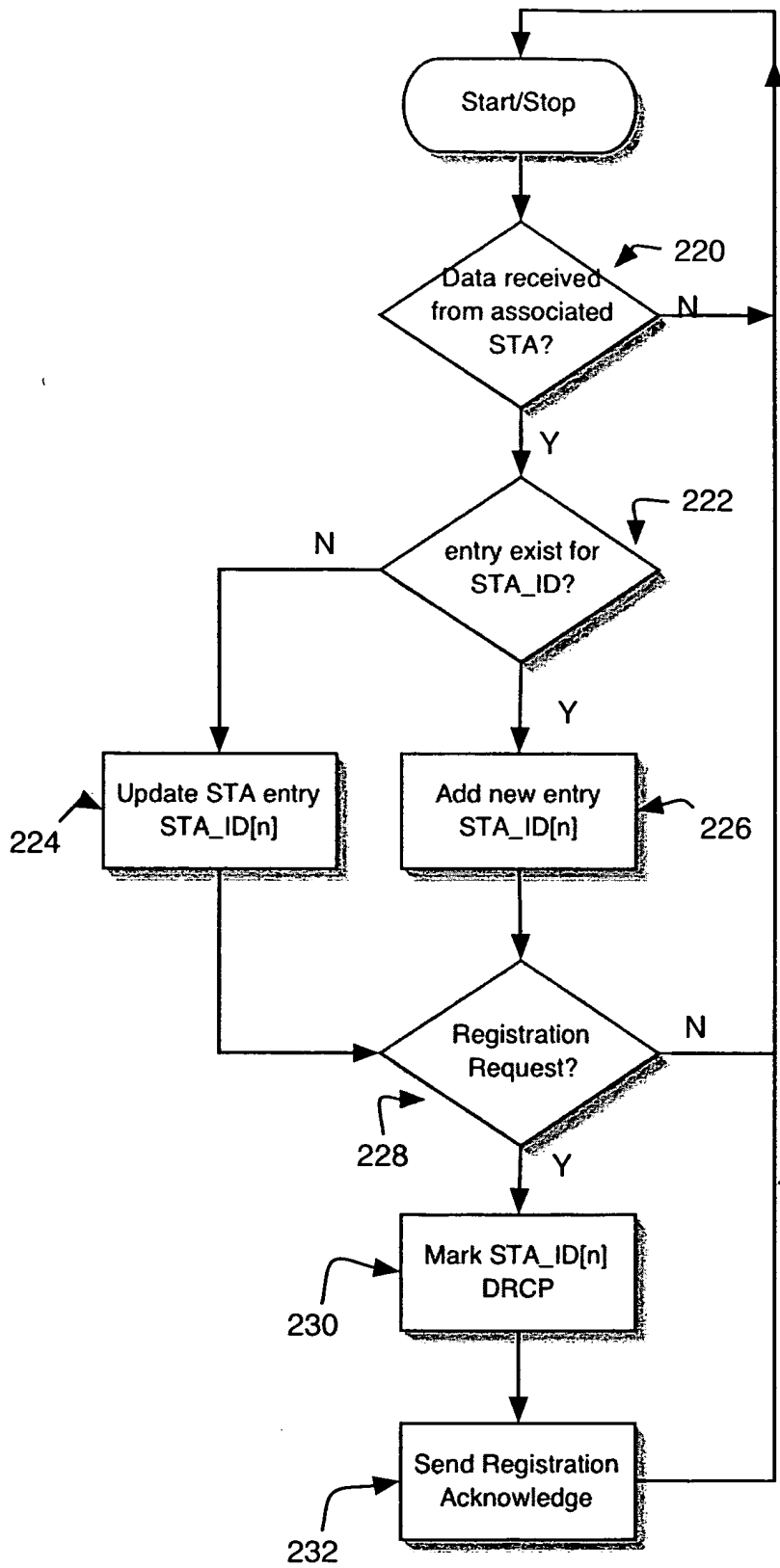


Fig. 15

240

| STA_ID | Quiet-time | DRCP-Active | Distance | max power | sta_load_factor | power samples | normalized_power | corrected_power |
|--------|------------|-------------|----------|-----------|-----------------|---------------|------------------|-----------------|
| STA[1] | 4 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| STA[2] | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... |
| STA[n] | 6 | 1 | 3 | 1 | 1 | 1 | 1 | 1 |

AP Associated STA Table

Fig. 16

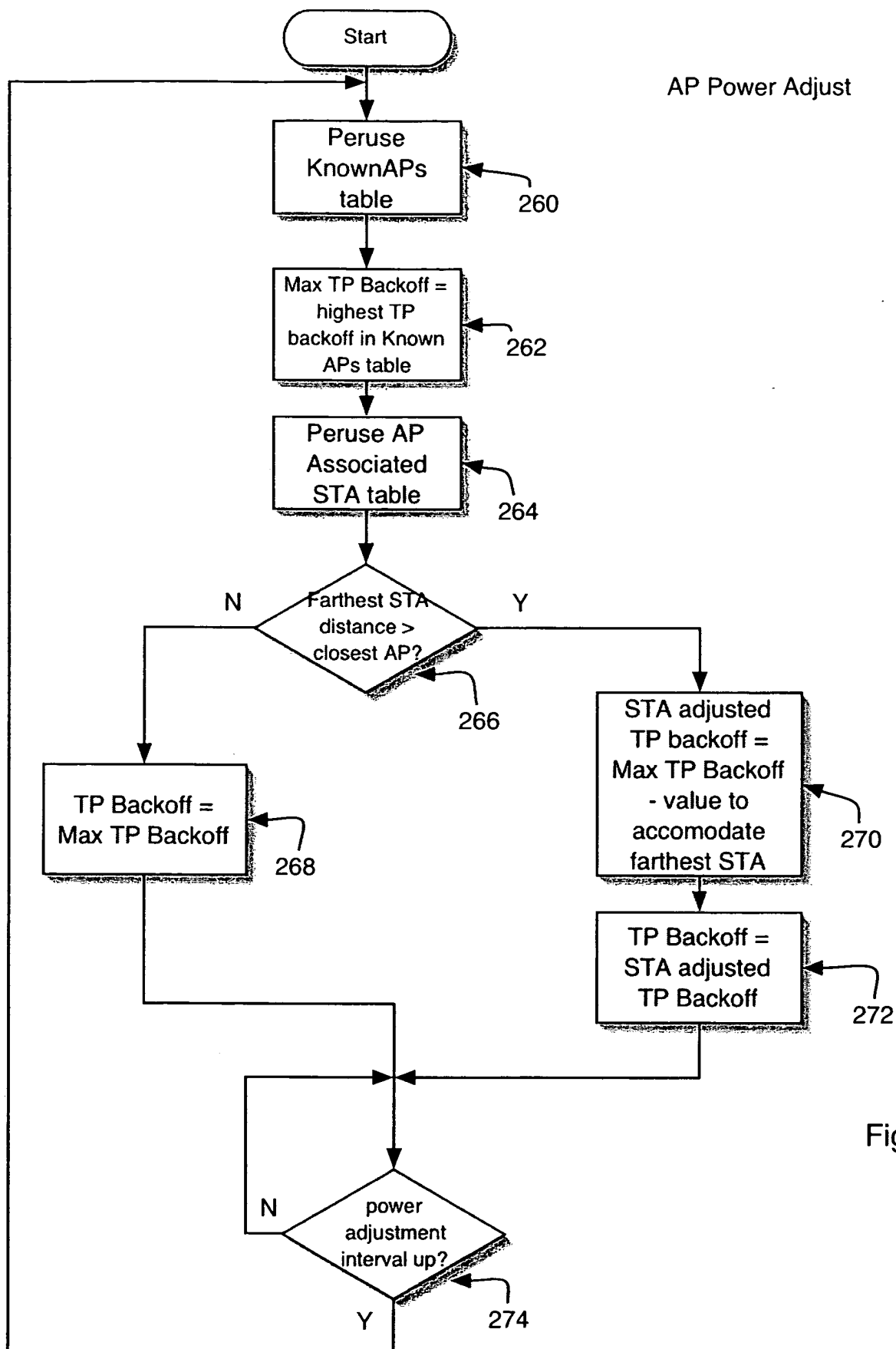


Fig. 17

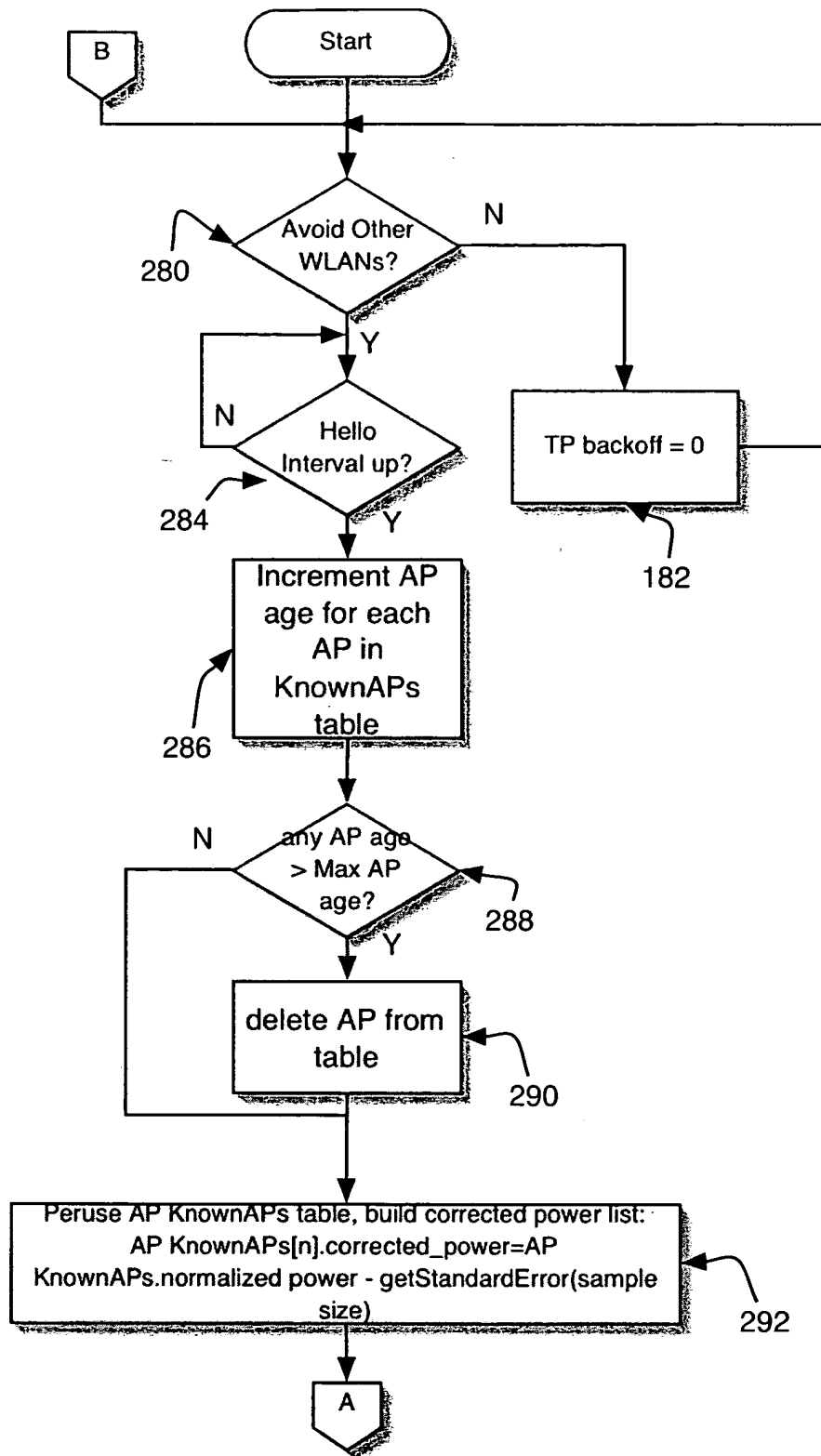


Fig. 18A

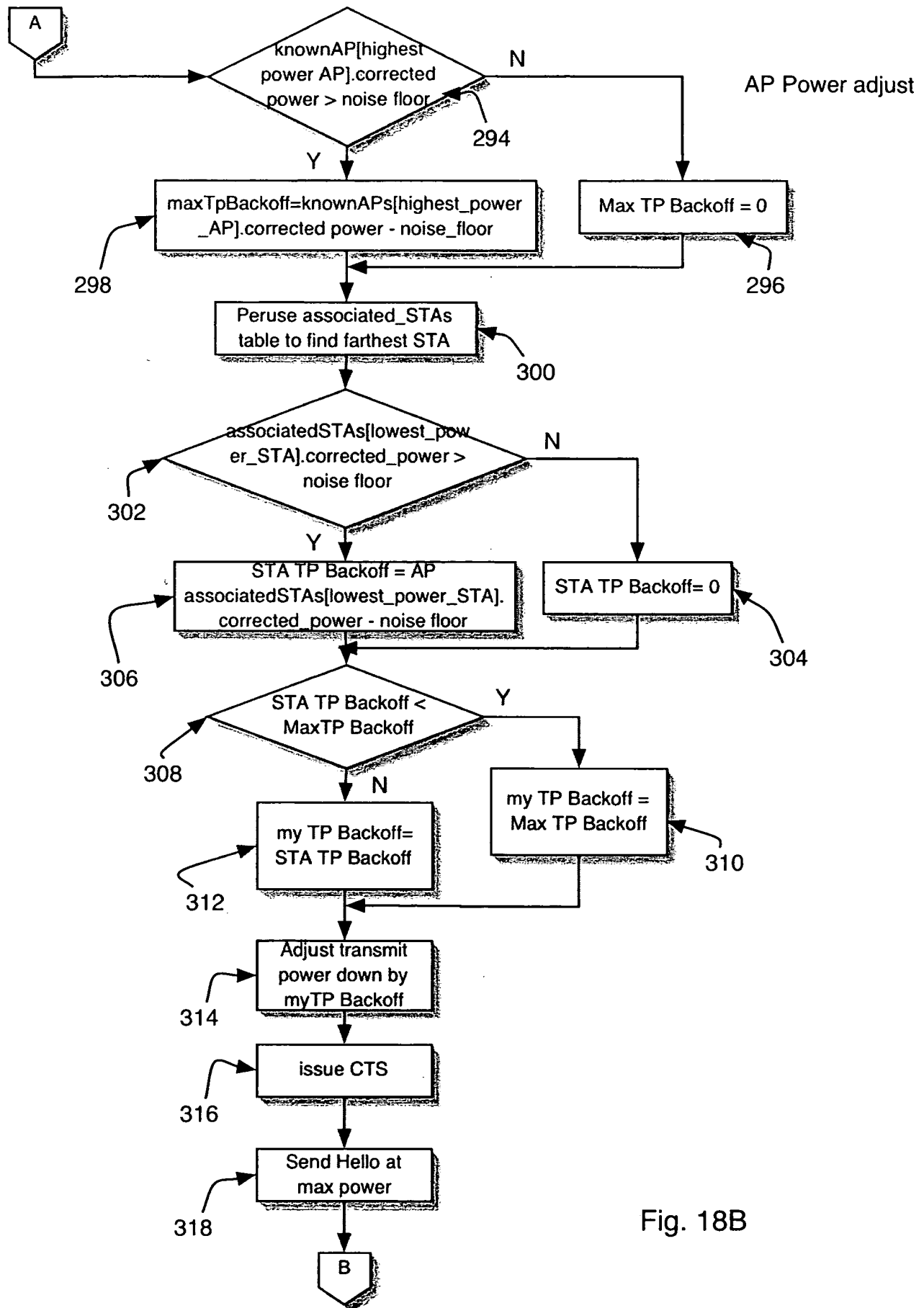


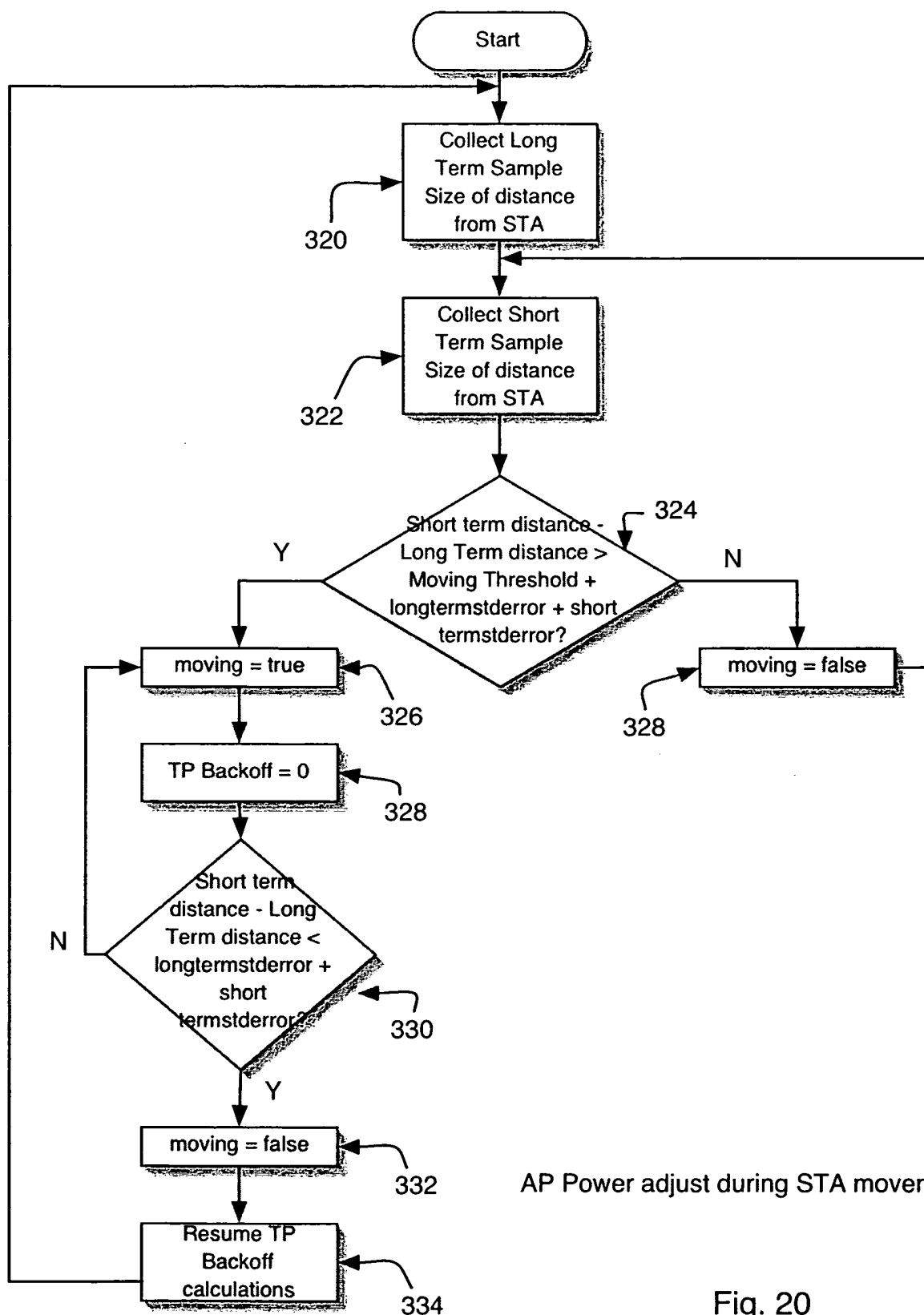
Fig. 18B

| Number of Samples | Calculated Standard Error (+/- dB) | Rounded Standard Error (+/- dB) |
|-------------------|------------------------------------|---------------------------------|
| 2 | 38.6 | 39 |
| 4 | 22.3 | 22 |
| 8 | 14.6 | 15 |
| 16 | 9.94 | 10 |
| 32 | 6.9 | 7 |
| 64 | 4.9 | 5 |
| 128 | 3.4 | 3 |
| 256 | 2.3 | 2 |
| 512 | 1.7 | 2 |
| 1024 | .8<dB<1.7 | 1 |
| 2000 | .8 | 1 |
| 2048 | 0<dB<.8 | 1 |

Table I

Standard error for 99% confidence on received power values averaged over number of samples for standard deviation = 15 dB.

Fig. 19



AP Power adjust during STA movement

Fig. 20

AP Auction

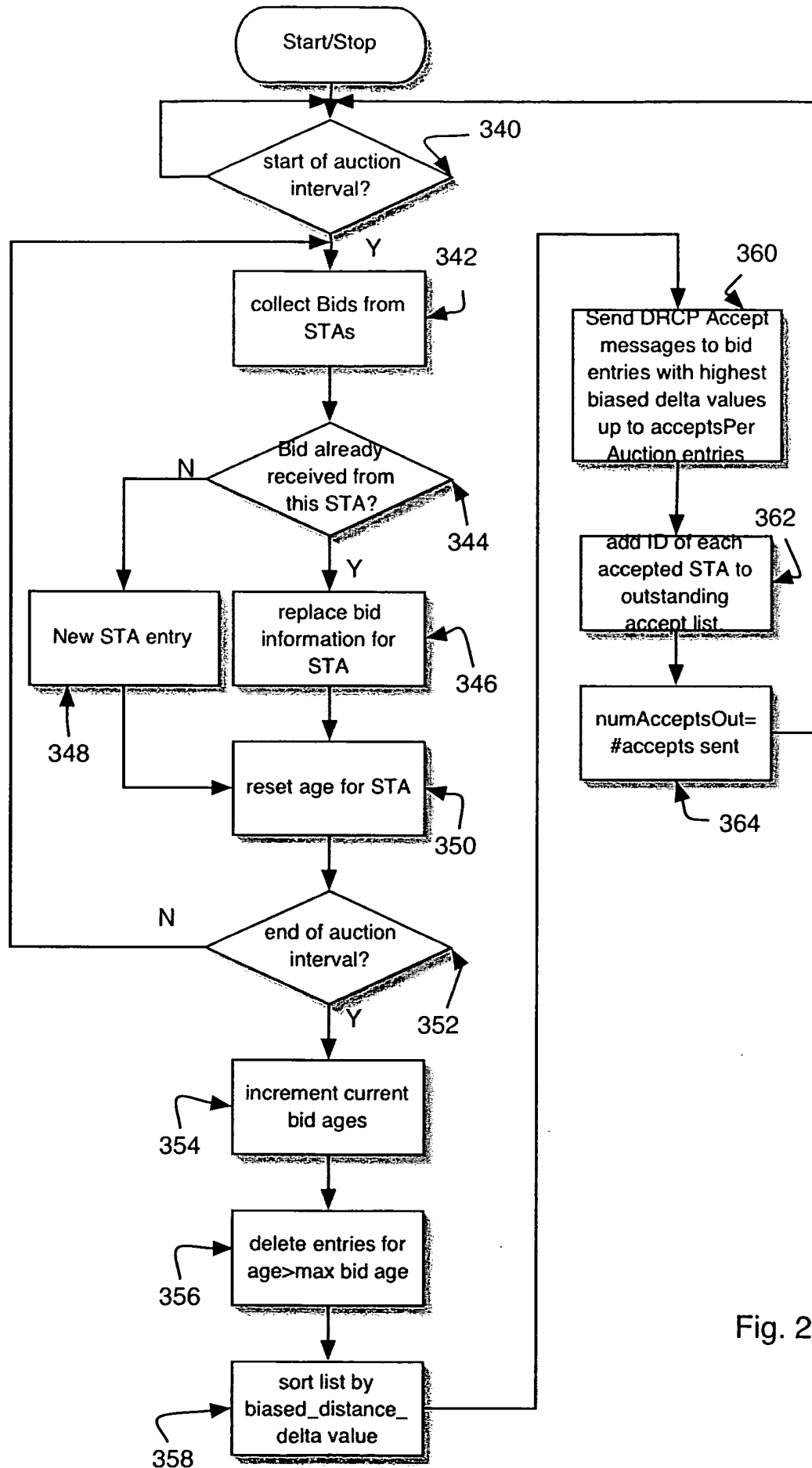


Fig. 21

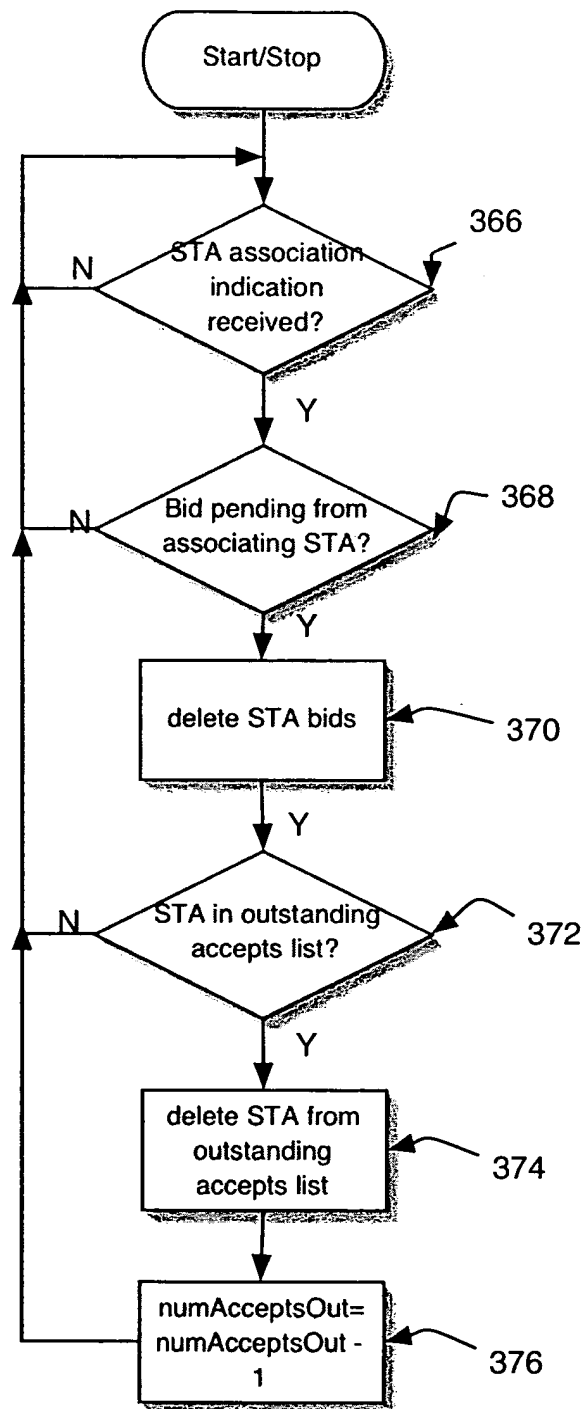


Fig. 22

STA Initialization

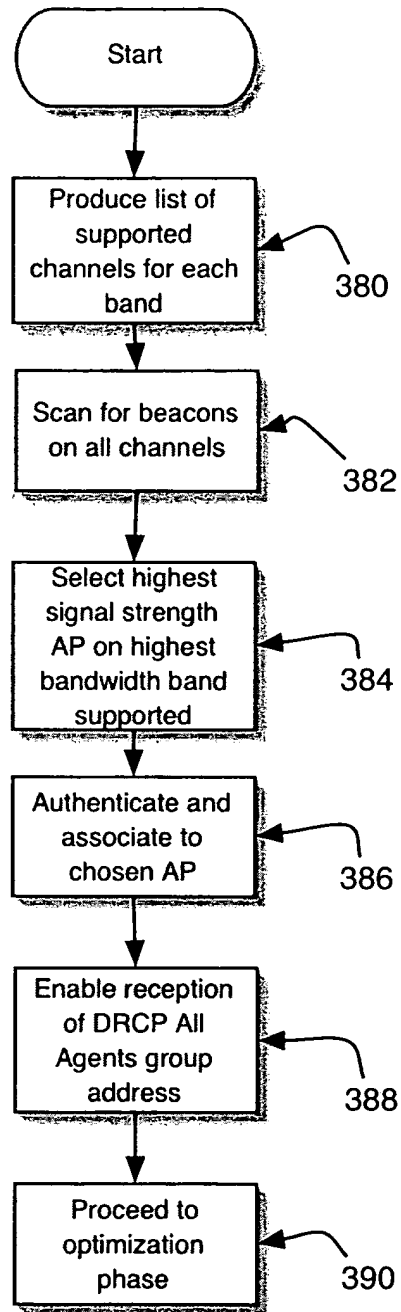


Fig. 23

STA Canvassing

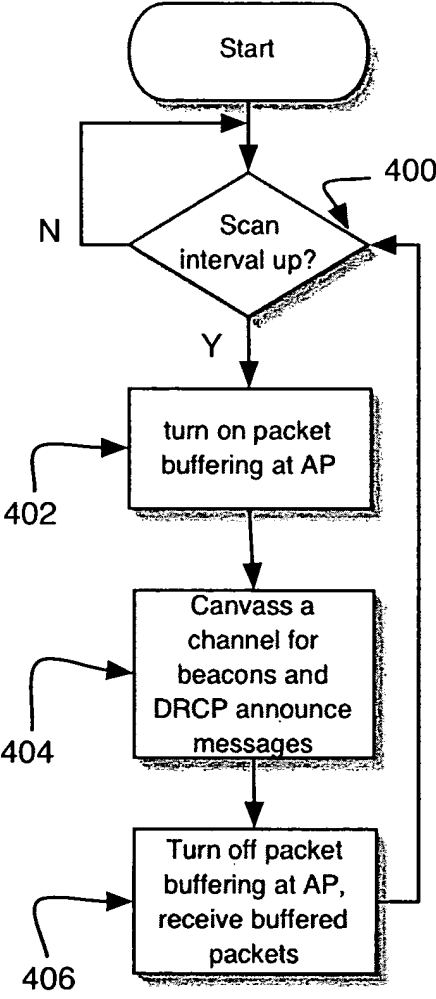


Fig. 24

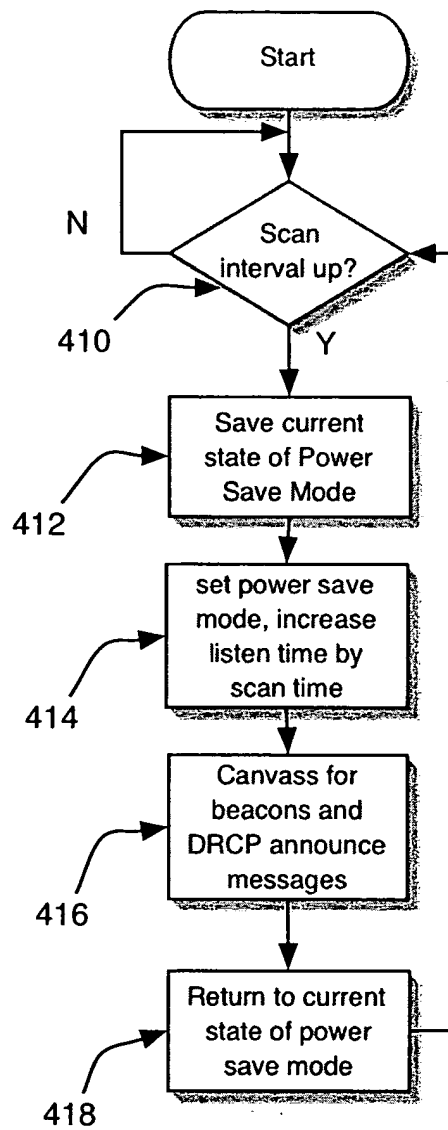


Fig. 25

430 →

| AP_ID | Channel ID | age | Load Factor | TP Backoff | Max Power | distance_sample s | distance | my_Load Factor | biased distance | corrected distance |
|------------|------------|-----|-------------|------------|-----------|-------------------|----------|----------------|-----------------|--------------------|
| AP[1] | 3 | 2 | 2 | <list> | <list> | 10 | avg | 2 | 2 | 2 |
| AP[2] | 7 | 3 | 3 | <list> | <list> | 7 | | 3 | 3 | 3 |
| ... | 5 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| AP[MAX_AP] | 2 | 1 | 1 | <list> | <list> | 13 | | 1 | 1 | 1 |

STA Known APs Table

Fig. 26

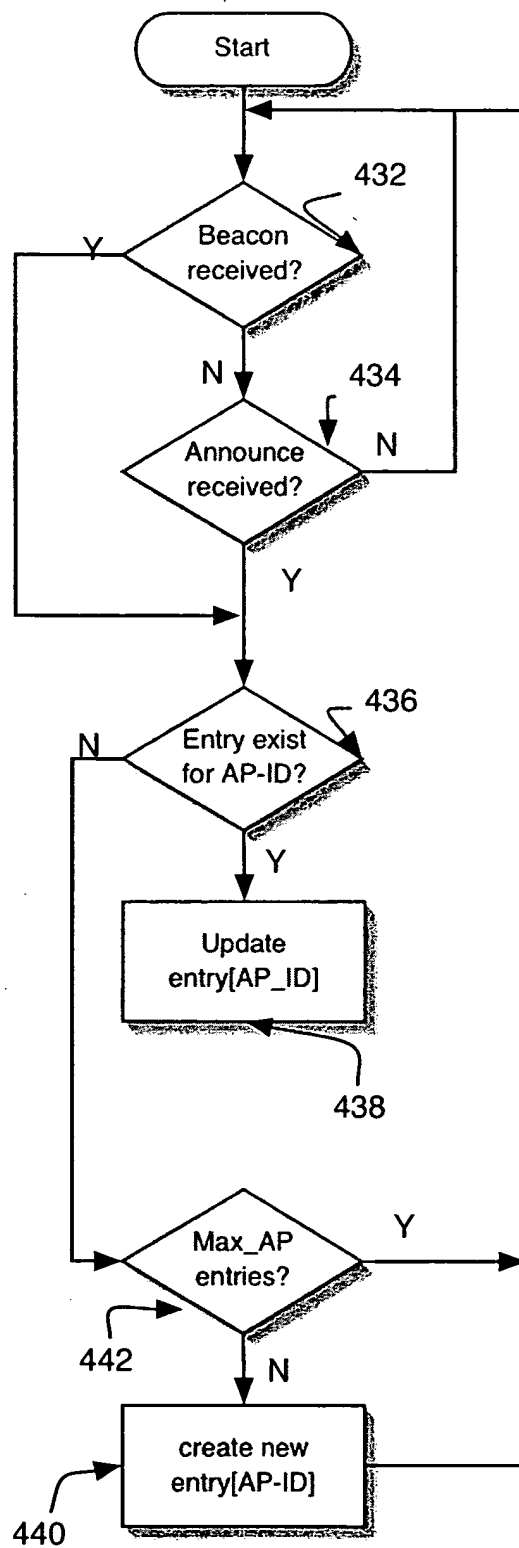


Fig. 27

STA Power Adjustment

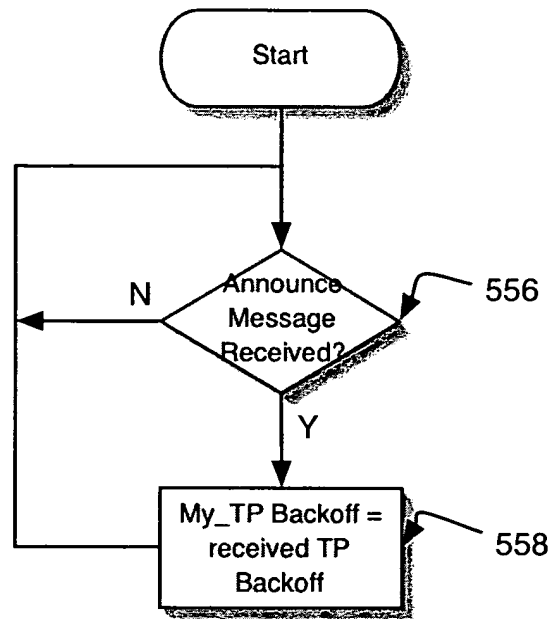


Fig. 28

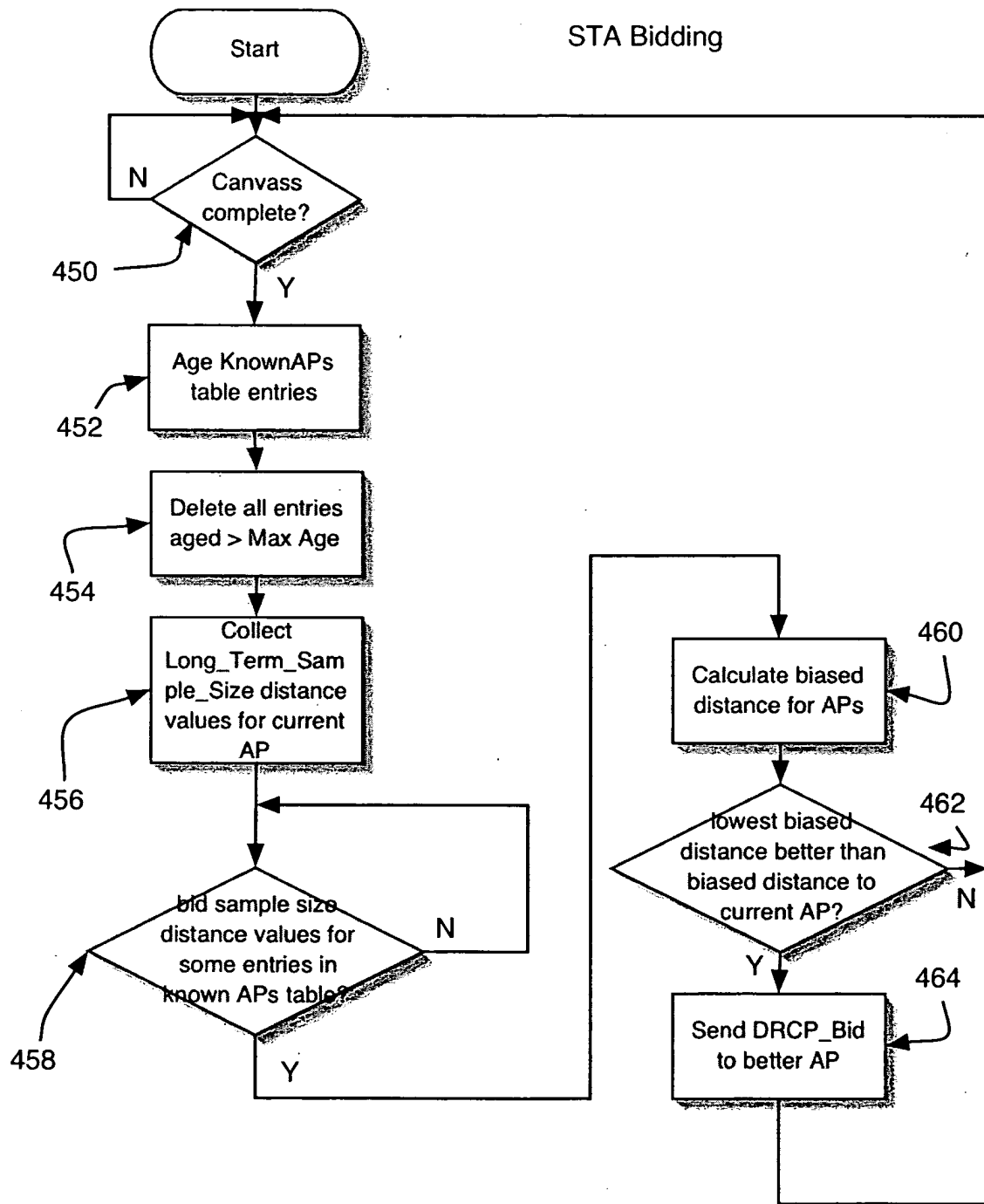


Fig. 29

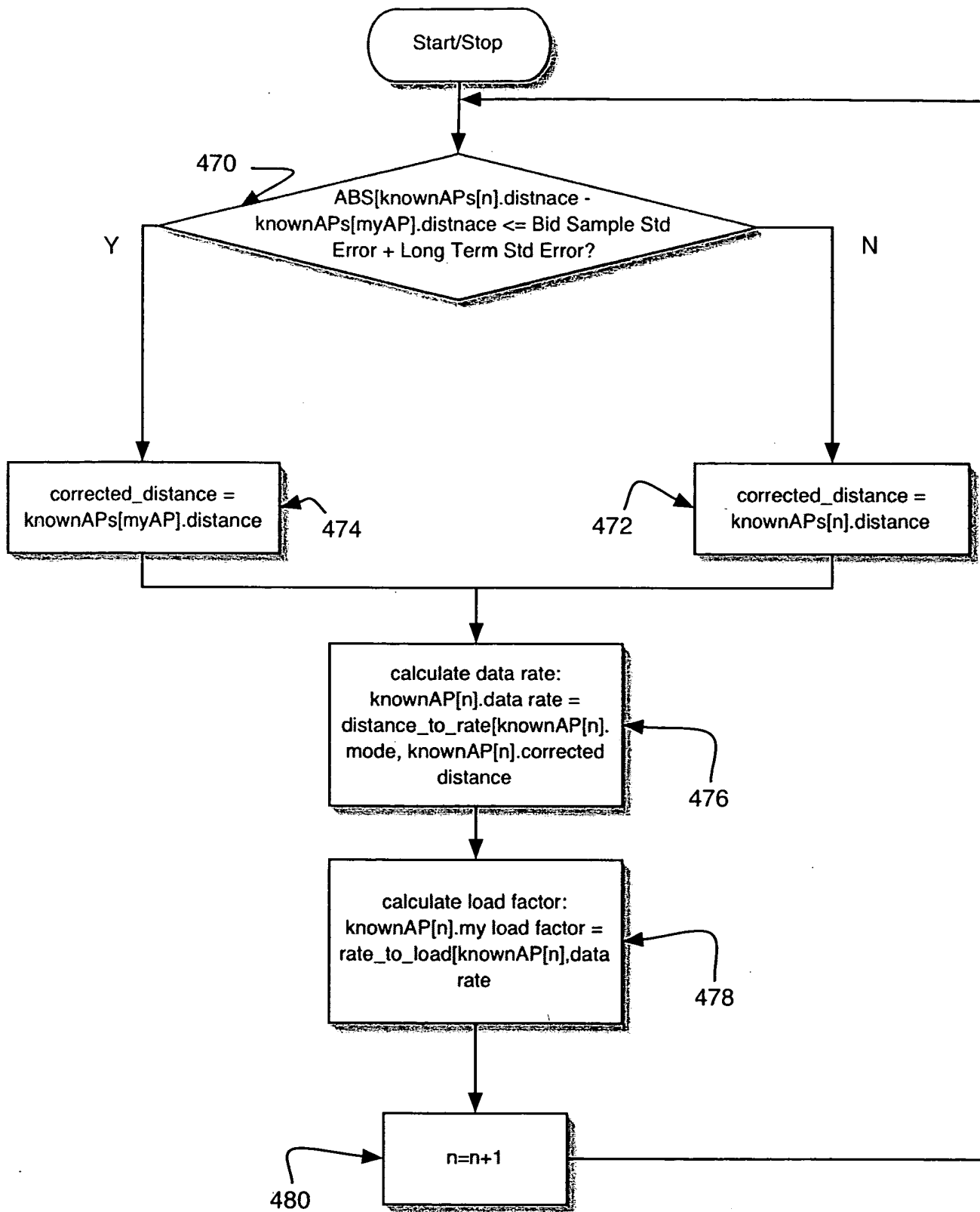


Fig. 30

| Distance in Banzais | 802.11a, g Mb/s | 802.11b Mb/s |
|------------------------|--------------------|-----------------|
| 0-68 | 54 | 11 |
| 69-72 | 48 | 11 |
| 73-76 | 36 | 11 |
| 77-80 | 24 | 11 |
| 81-83 | 18 | 11 |
| 84-85 | 12 | 5.5 |
| 86 | 9 | 5.5 |
| 87 | 9 | 2 |
| 88 | 6 | 2 |
| 89 | 2 | 2 |
| 90-91 | 2 | 1 |
| 92-94 | 1 | 0 |
| 95-97 | .5 | 0 |

Table II
Distance_to_Rate Table, 802.11

Fig. 31

| Data Rate | Load Factor |
|-----------|-------------|
| 108 | 4 |
| 72 | 6 |
| 54 | 8 |
| 48 | 9 |
| 36 | 12 |
| 24 | 18 |
| 18 | 24 |
| 11 | 39 |
| 9 | 48 |
| 6 | 72 |
| 5.5 | 79 |
| 2 | 216 |
| 1 | 432 |
| .5 | 864 |
| 0 | 65,535 |

Table III

Rate_to_Load table for 802.11

Fig. 32

Biased Distance Calculation

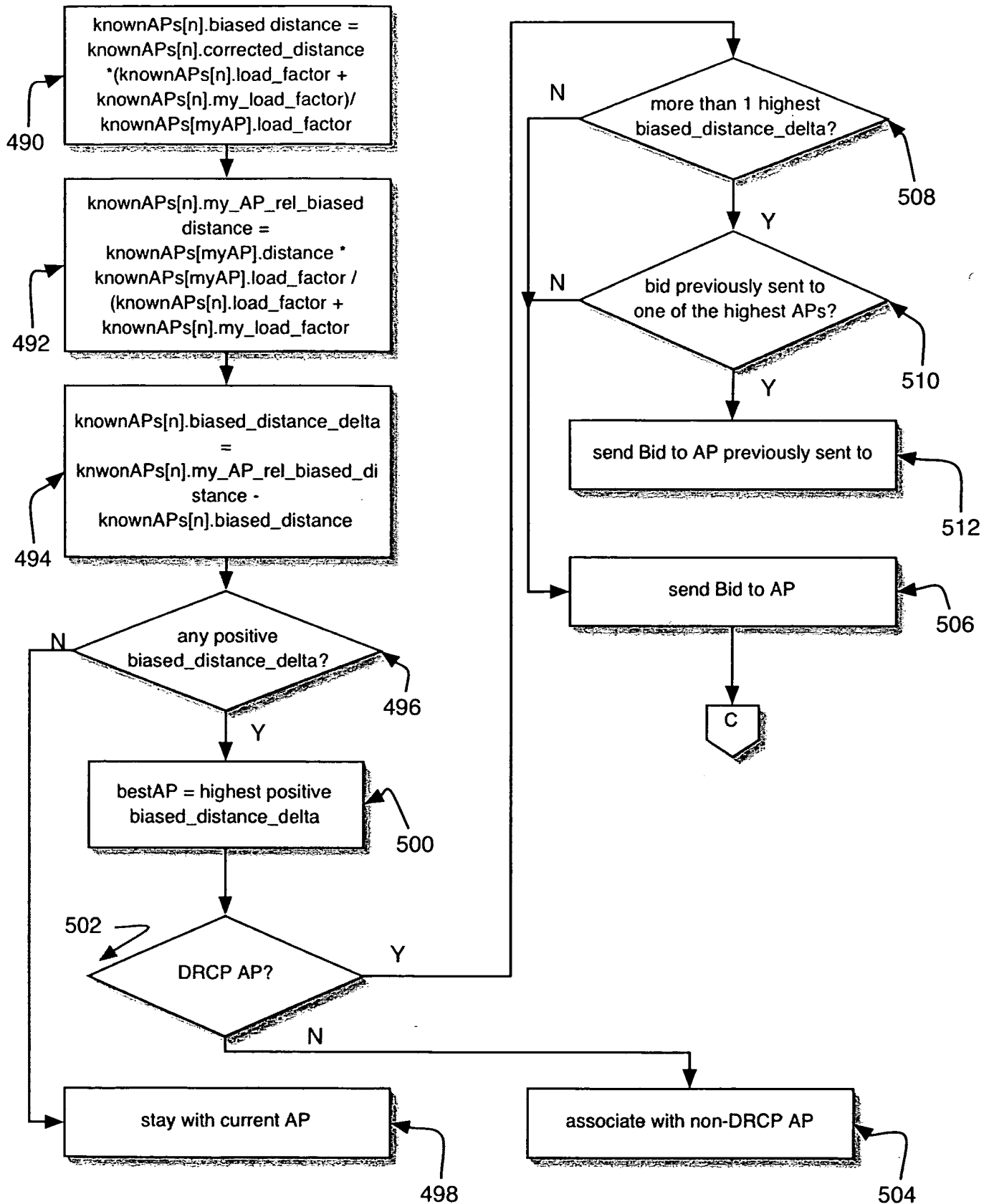


Fig. 33A

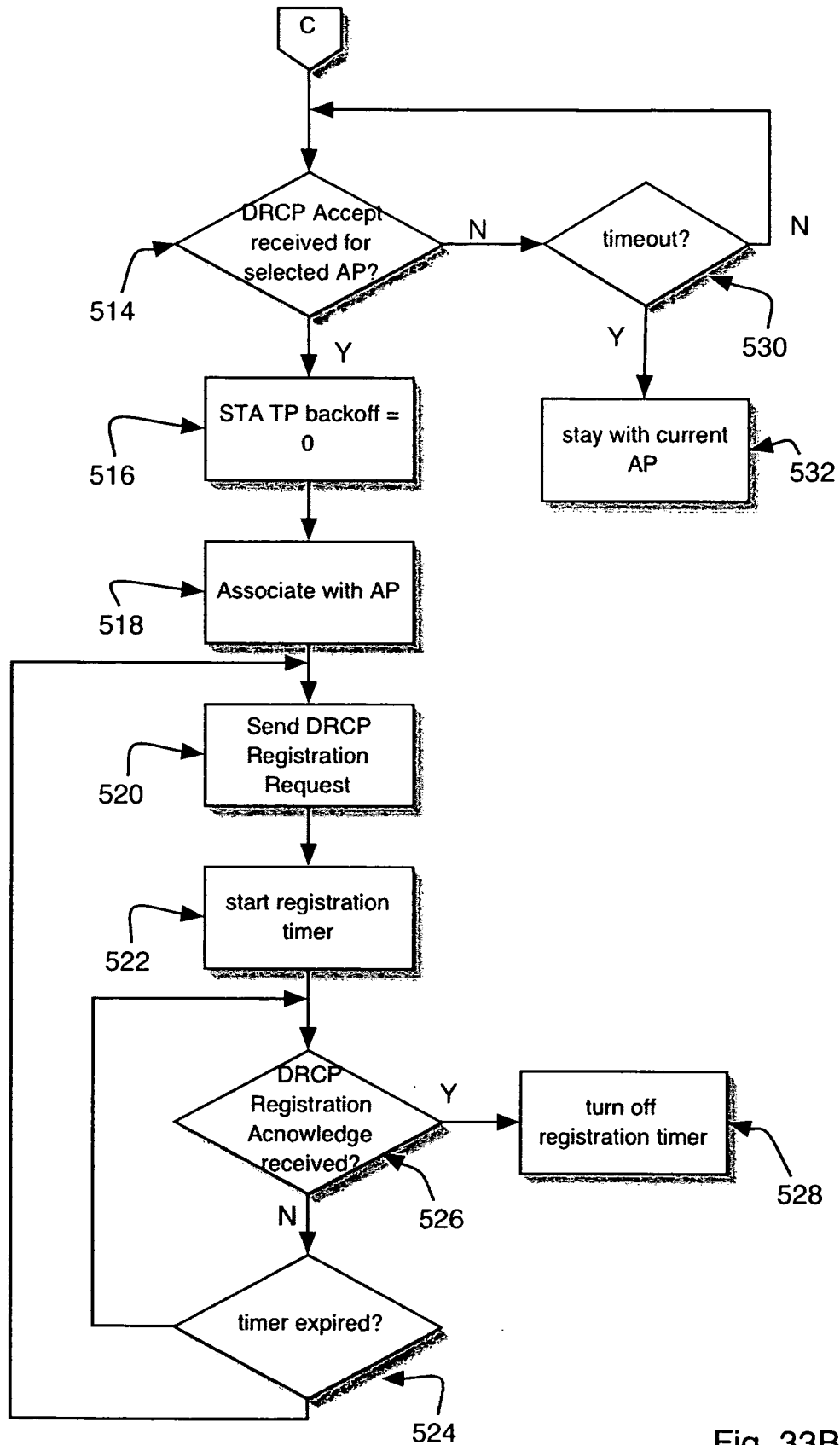


Fig. 33B

STA movement detection

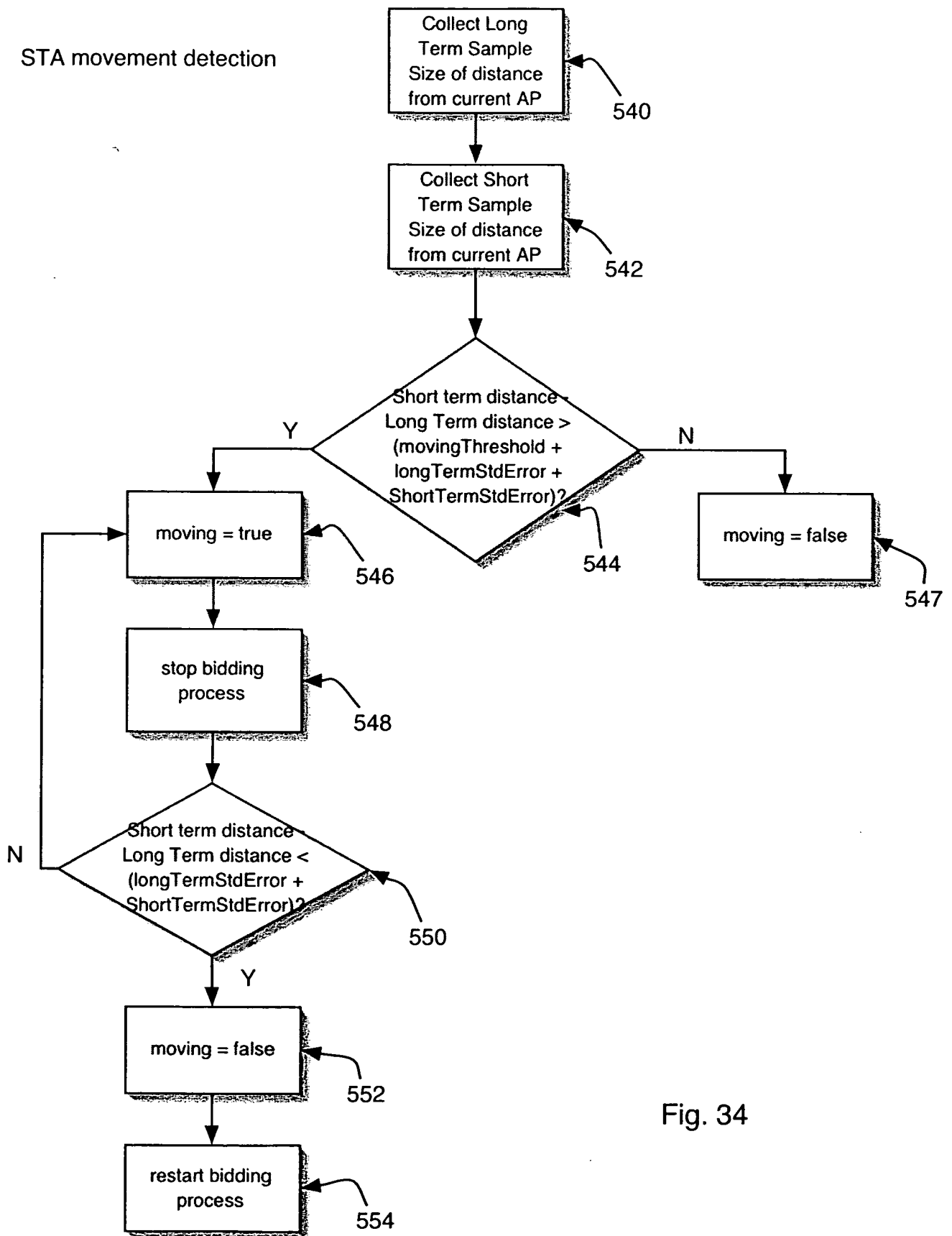


Fig. 34

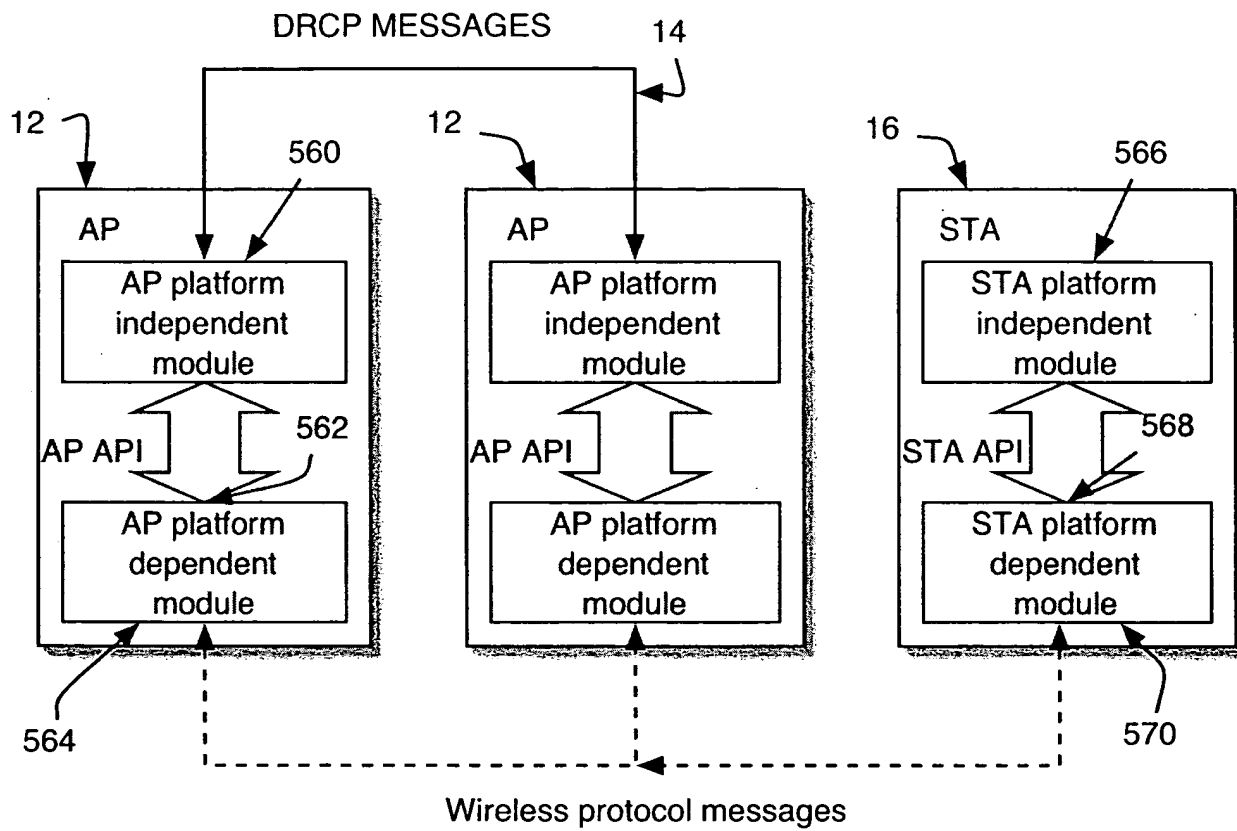


Fig. 35

802.11 AP DRCP Architecture

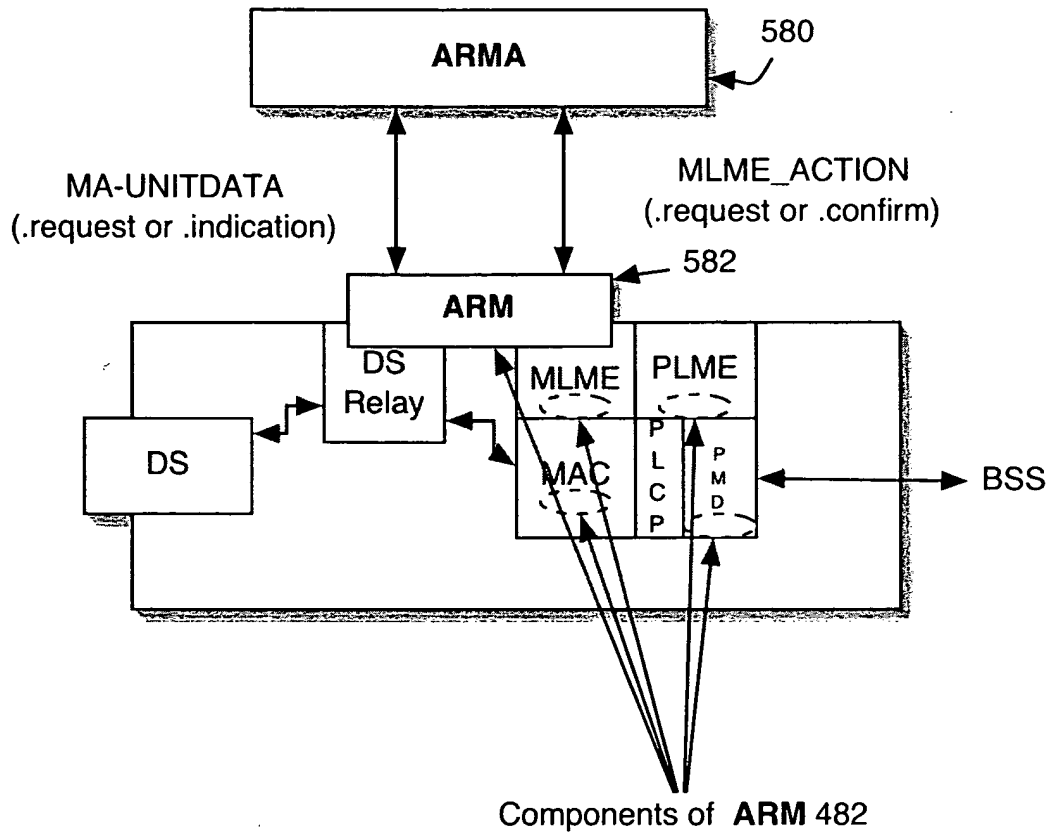


Fig. 36

802.11 STA DRCP Architecture

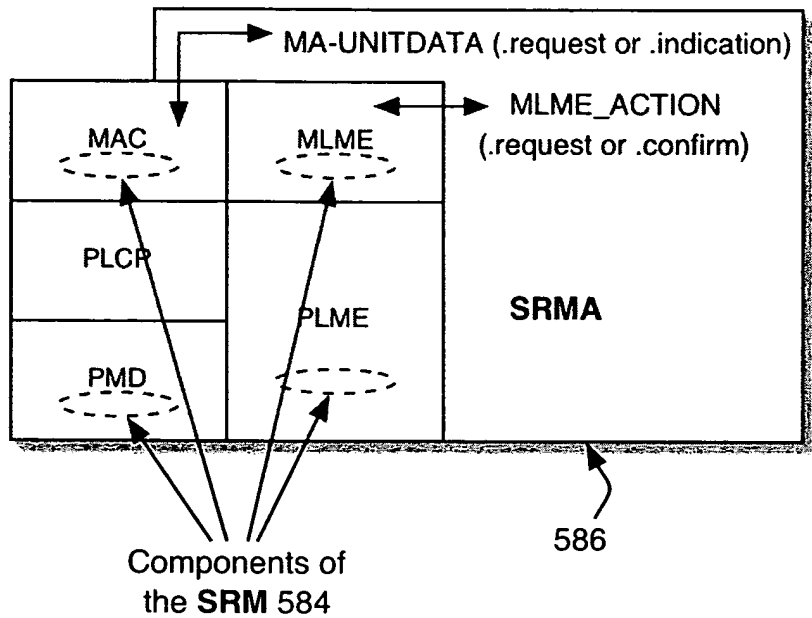


Fig. 37

Encoding of DRCP Message in an 802.11 Management Frame of Subtype Beacon

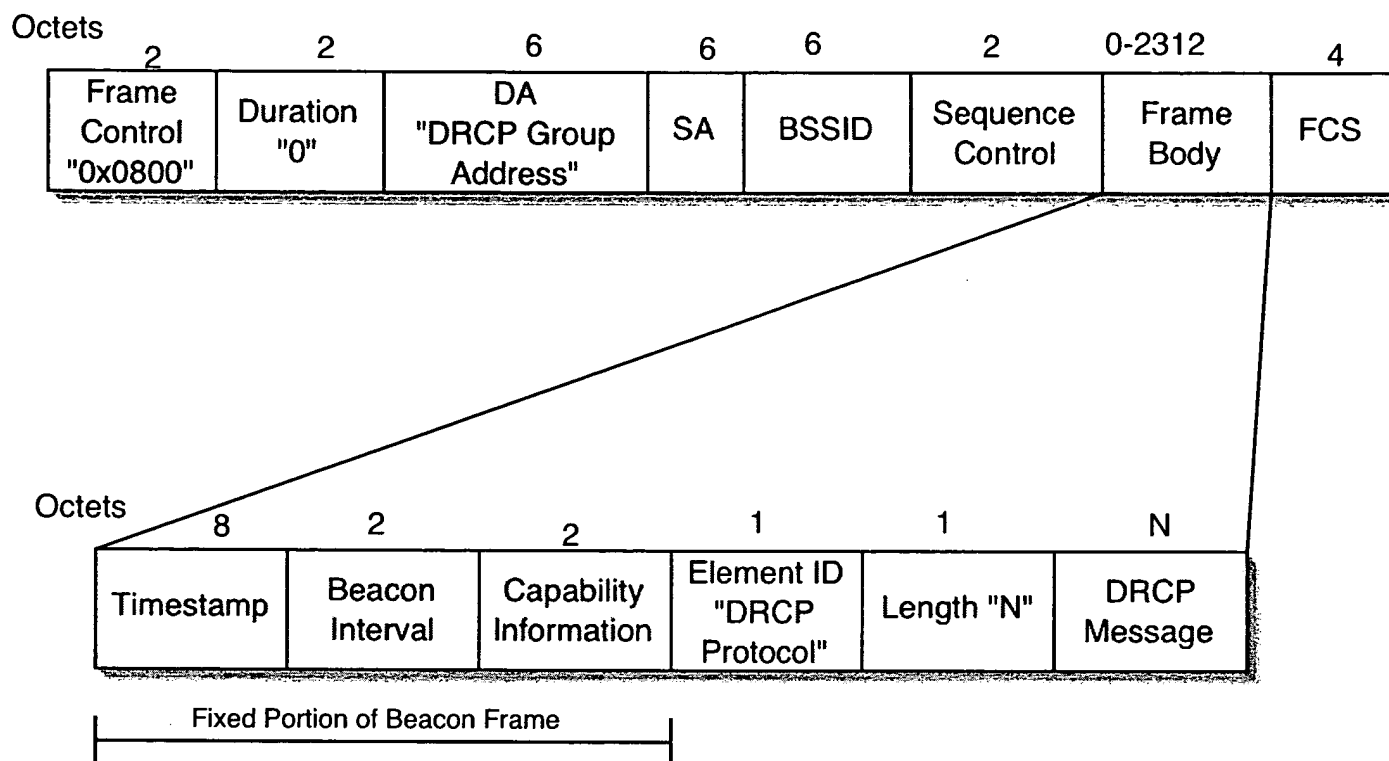


Fig. 38

Encoding of DRCP Message in an 802.11 Data Frame

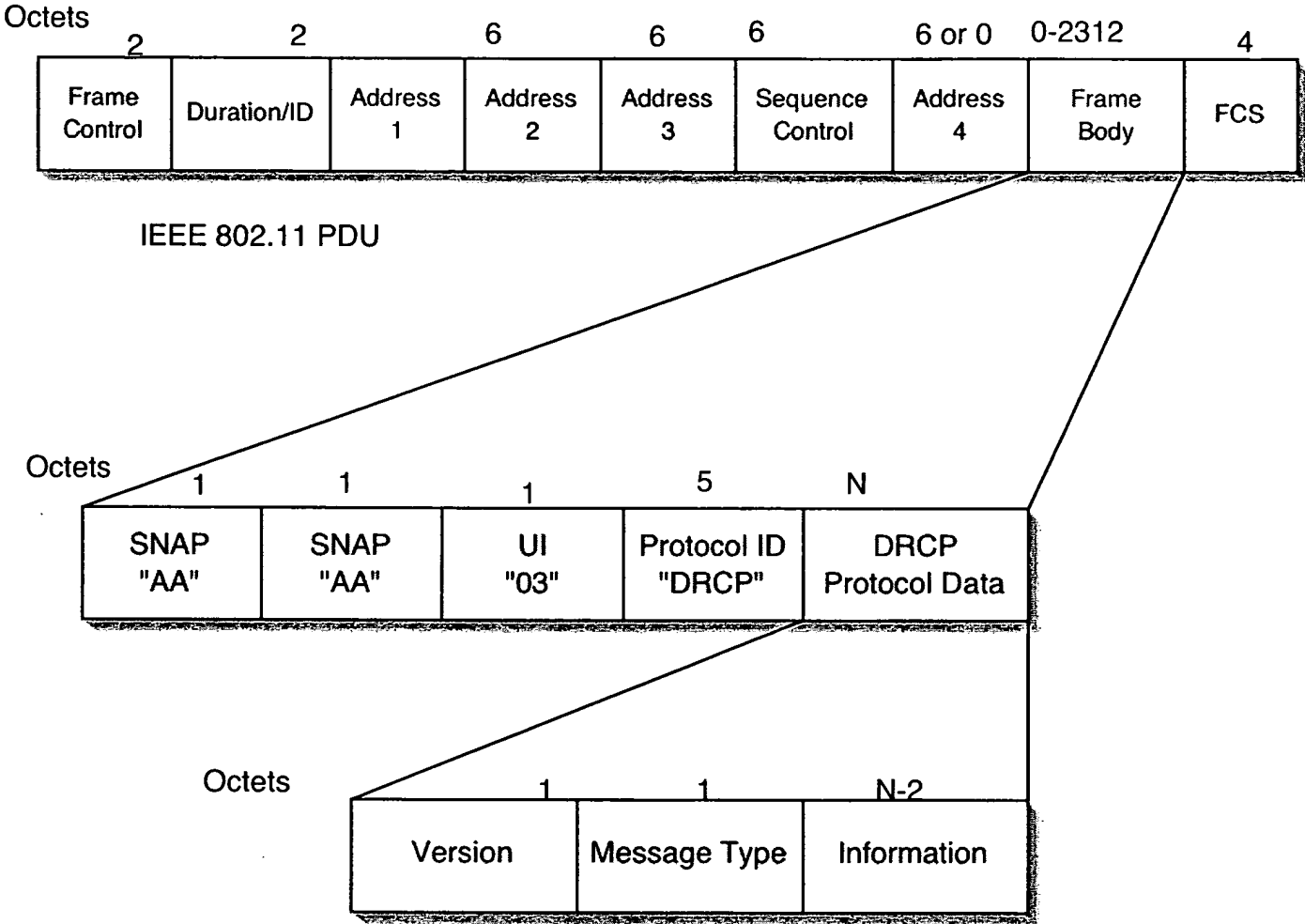


Fig. 39

| Message Type | Usage | Data Rate | Max Power |
|-------------------------------|--------------------------------------------------------------------|-----------------|------------------------|
| DRCP Preclaim | Used by ARMAs in the channel selection process | Lowest Datarate | Max Power |
| DRCP Claim | Used by ARMAs in the channel selection process | Lowest Datarate | Max Power |
| DRCP Announce | Used by ARMAs to announce their presence to SRMAs and other ARMAs. | Lowest Datarate | Max Power |
| DRCP Bid | Used by SRMAs to bid for slots on ARMAs | STA Datarate | Max Power - TP Backoff |
| DRCP Accept | Used by ARMAs to signal to SRMAs permission to associate | STA Datarate | Max Power - TP Backoff |
| DRCP Registration Request | Used by STAs to tell ARMAs they will associate | STA Datarate | Max Power - TP Backoff |
| DRCP Registration Acknowledge | Used by ARMAs to tell STA it received registration request | STA Datarate | Max Power - TP Backoff |

Fig. 40

| Name | Size | Description |
|-----------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type | 1 | Message type. Values: 1 = DRCP Claim 2 = DRCP Announce 3 = DRCP Preclaim 4 = DRCP Bid 5 = DRCP Accept 6 = DRCP Registration Request 7 = DRCP Registration Acknowledge |
| Channel ID | 1 | Indicates the channel of the originating station |
| AP-ID | 6 | The MAC Address of the AP in which the transmitting ARMA is instantiated |
| SSID | 32 | The Service Set ID (SSID) of the AP in which the transmitting ARMA is instantiated. This value is also referred to as the "Network Name". |
| Load Factor | 2 | The sum of the loads of the ATAs currently associated to the transmitting AP. |
| TP Backoff | 2 | Transmit power backoff value in use by the transmitting AP. |
| Max Power | 2 | Maximum pwer output, in dBm, of the transmitting AP's radio. |
| Biased Distance Delta | 4 | The difference between the biased distance from the transmitting STA to its current AP and the destination AP. |
| STA ID | 6 | The MAC address of the STA in which the transmitting SRMA is instantiated. |
| STA Assoc AP ID | 6 | The MAC address of the AP to which the transmitting STA is currently associated. |
| Bid AP ID | 6 | The MAC address of the AP to which the transmitting STA is bidding. |
| Accepted STA ID | 6 | The MAC address of the STA that the sending AP is accepting. |
| STA Reported AP ID | 6 | The MAC address of the AP that was identified in the last Bid message as the accepted STA's associated AP. |
| Max TP Backoff | 2 | Max dB's backoff capable of an AP |
| Adjacency Vector Sum | 2 | Sum of received power levels from all APs heard during scanning and preclaiming. |

Fig. 41

Byte Address

| | | | | |
|---|--------------|------|-------------------------|------------|
| 0 | Version | Type | Flags | Channel ID |
| 4 | AP ID (MSBs) | | | |
| 8 | AP ID (LSBs) | | Max Backoff Max power | |

DRCP Preclaim Message

Fig. 42

Byte Address

| | | | | |
|----|----------------------|------|-------------------------|------------|
| 0 | Version | Type | Flags | Channel ID |
| 4 | AP ID (MSBs) | | | |
| 8 | AP ID (LSBs) | | Max Backoff Max Power | |
| 12 | Adjacency Vector Sum | | Reserved | |

DRCP Claim Message

Fig. 43

Byte Address

| | | | | |
|----|-----------------------|------|-------------------------|------------|
| 0 | Version | Type | Flags | Channel ID |
| 4 | AP ID (MSBs) | | | |
| 8 | AP ID (LSBs) | | Max Backoff Max Power | |
| 12 | TP Backoff Reserved | | Load Factor | |

DRCP Announce Message

Fig. 44

Byte Address

| | | | | |
|----|------------------------|------|------------------------|------------|
| 0 | Version | Type | Flags | Channel ID |
| 4 | Biased Distance Delta | | | |
| 8 | STA ID (MSBs) | | | |
| 12 | STA ID (LSBs) | | STA Assoc AP ID (MSBs) | |
| 16 | STA Assoc AP ID (LSBs) | | | |
| 20 | Bid AP ID (MSBs) | | | |
| 24 | Bid AP (LSBs) | | Reserved | |

DRCP Bid Message

Fig. 45

Byte Address

| | | | | |
|----|---------------------------|------|------------------------|------------|
| 0 | Version | Type | Flags | Channel ID |
| 4 | AP ID (MSBs) | | | |
| 8 | AP ID (LSBs) | | Accepted STA ID (MSBs) | |
| 12 | Accepted STA ID (LSBs) | | | |
| 16 | STA Reported AP ID (MSBs) | | | |
| 20 | STA Reported AP ID (LSBs) | | Reserved | |

DRCP Accept Message

Fig. 46

Byte Address

| | | | | |
|----|------------------------|------|------------------------|------------|
| 0 | Version | Type | Flags | Channel ID |
| 4 | AP ID (MSBs) | | | |
| 8 | AP ID (LSBs) | | Accepted STA ID (MSBs) | |
| 12 | Accepted STA ID (LSBs) | | | |

DRCP Registration Request Message

Fig. 47

Byte Address

| | | | | |
|----|------------------------|------|------------------------|------------|
| 0 | Version | Type | Flags | Channel ID |
| 4 | AP ID (MSBs) | | | |
| 8 | AP ID (LSBs) | | Accepted STA ID (MSBs) | |
| 12 | Accepted STA ID (LSBs) | | | |

DRCP Registration Acknowledge Message

Fig. 48

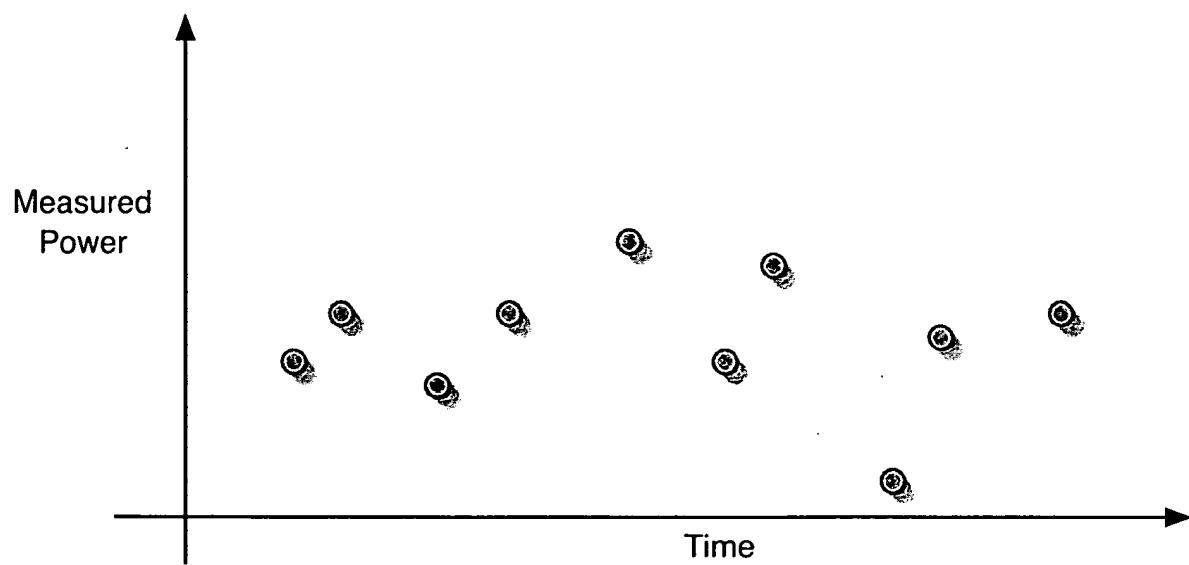


Fig. 49

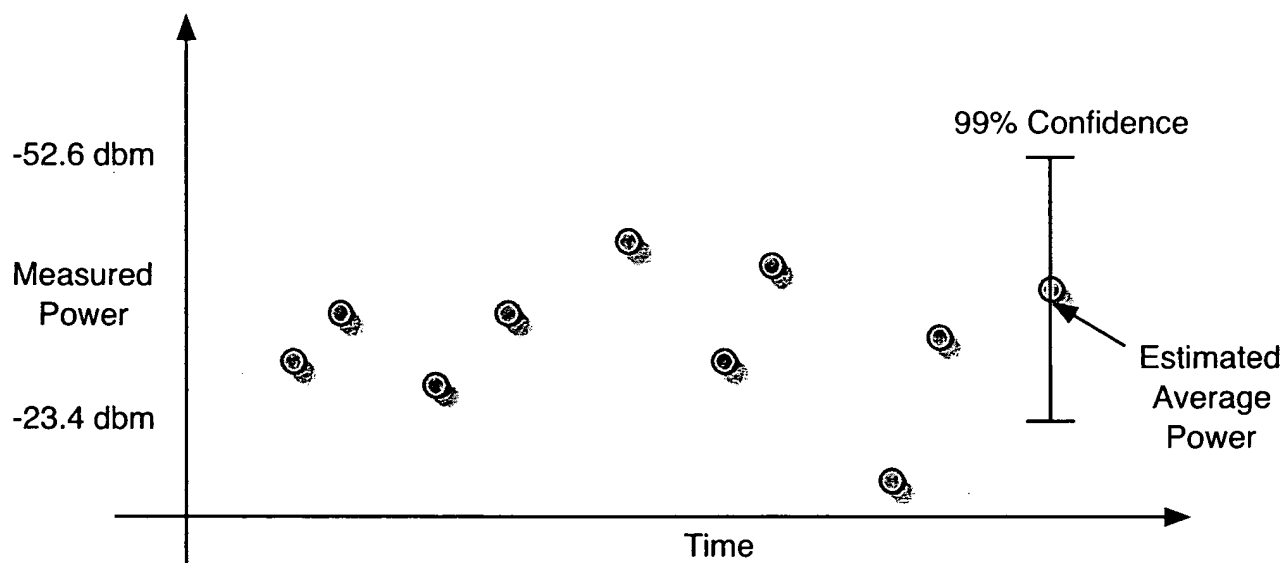


Fig. 50

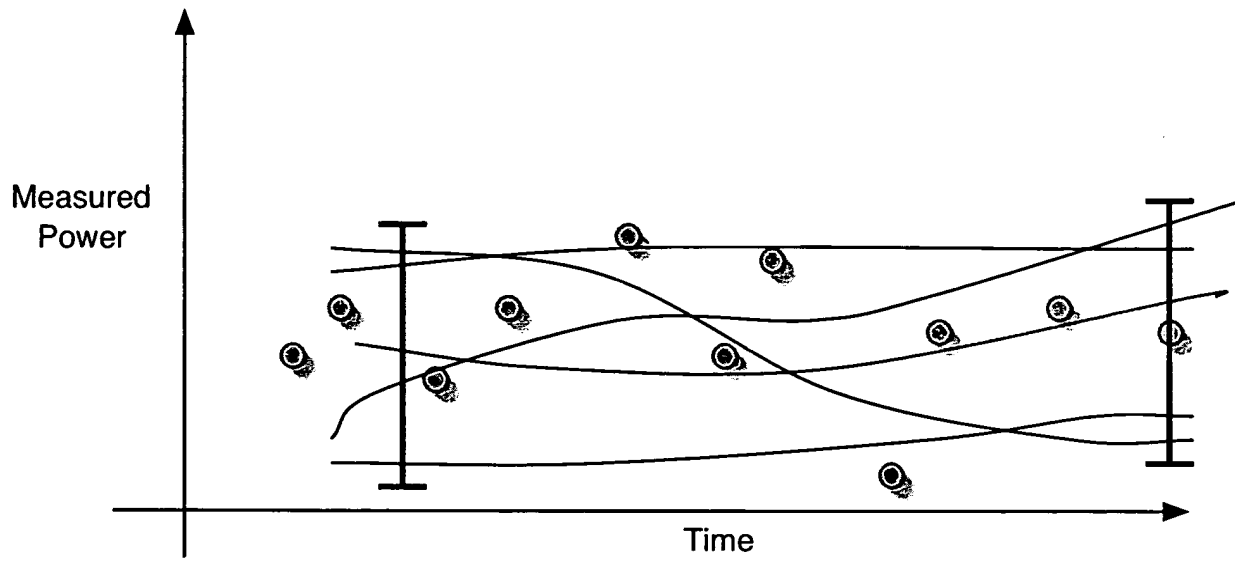


Fig. 51

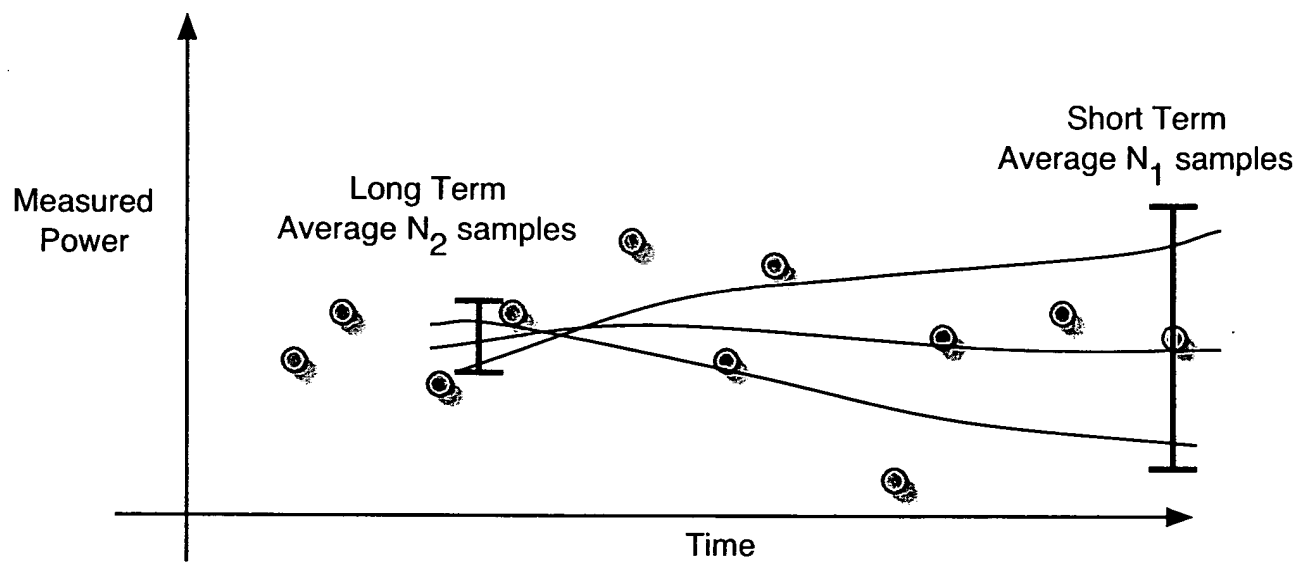


Fig. 52

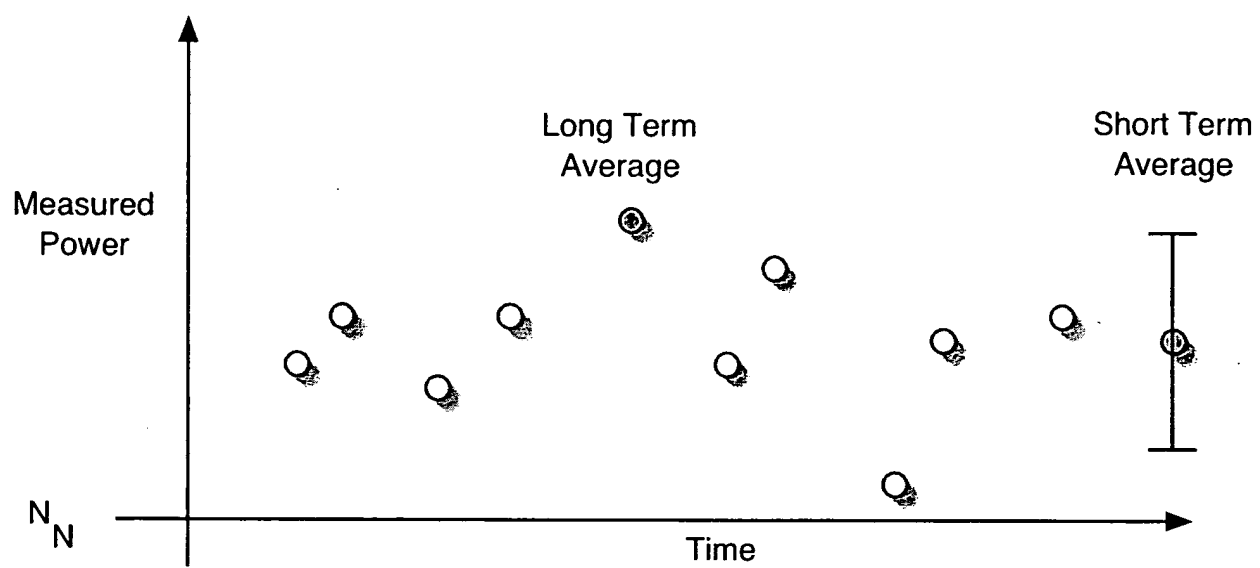


Fig. 53

| Sample Time Duration | # Power Samples (N2) | Upper 99% Confidence Interval | Lower 99% Confidence Interval |
|-------------------------|-------------------------|----------------------------------|----------------------------------|
| 1 sec | 20 | -29.1 dbm | -46.9 dbm |
| 10 sec | 200 | -35.3 dbm | -40.7 dbm |
| 100 sec | 2000 | -37.2 dbm | -38.3 dbm |
| 1000 sec | 20,000 | -37.7 dbm | -38.3 dbm |

Fig. 54

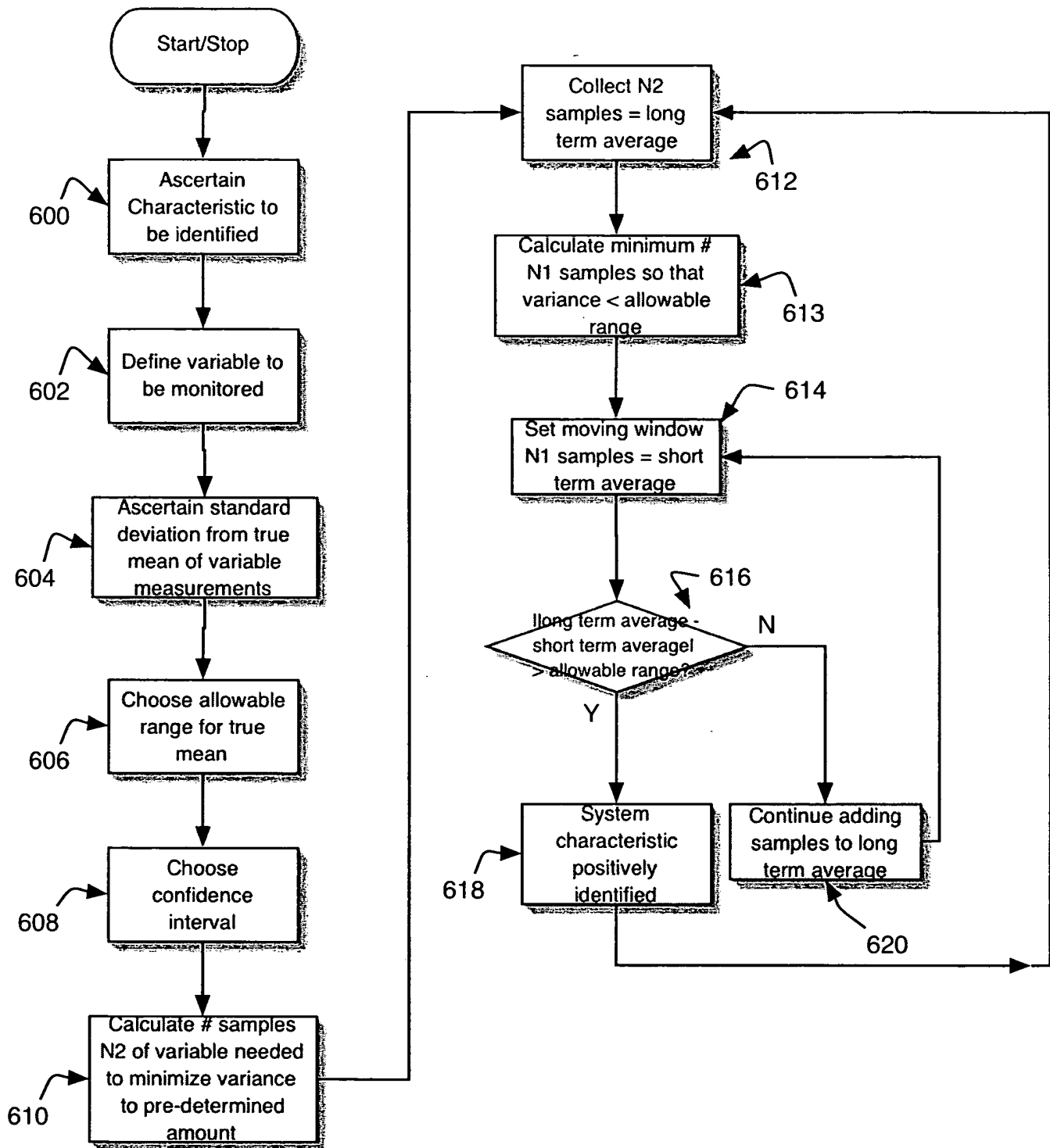


Fig. 55

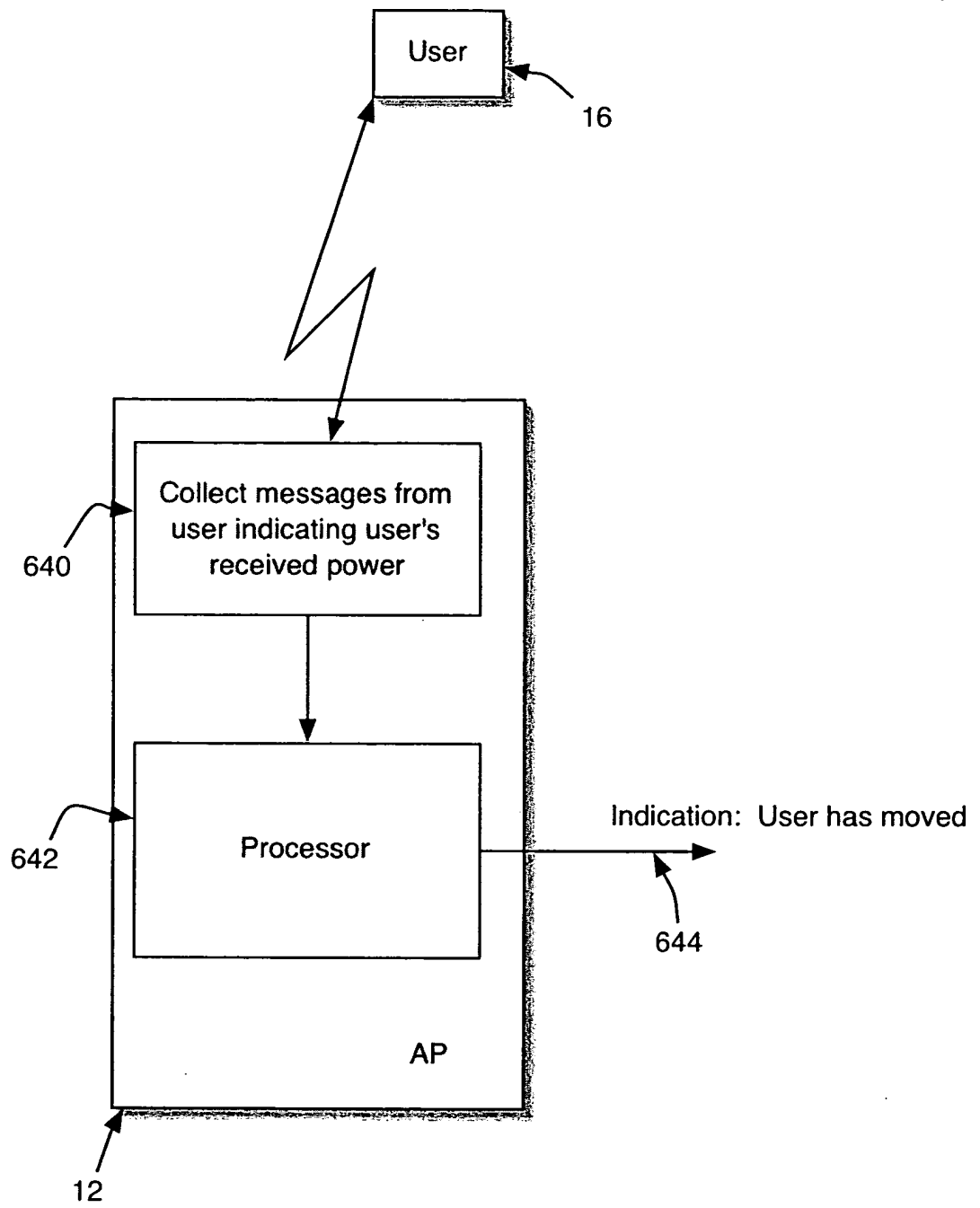


Fig. 56

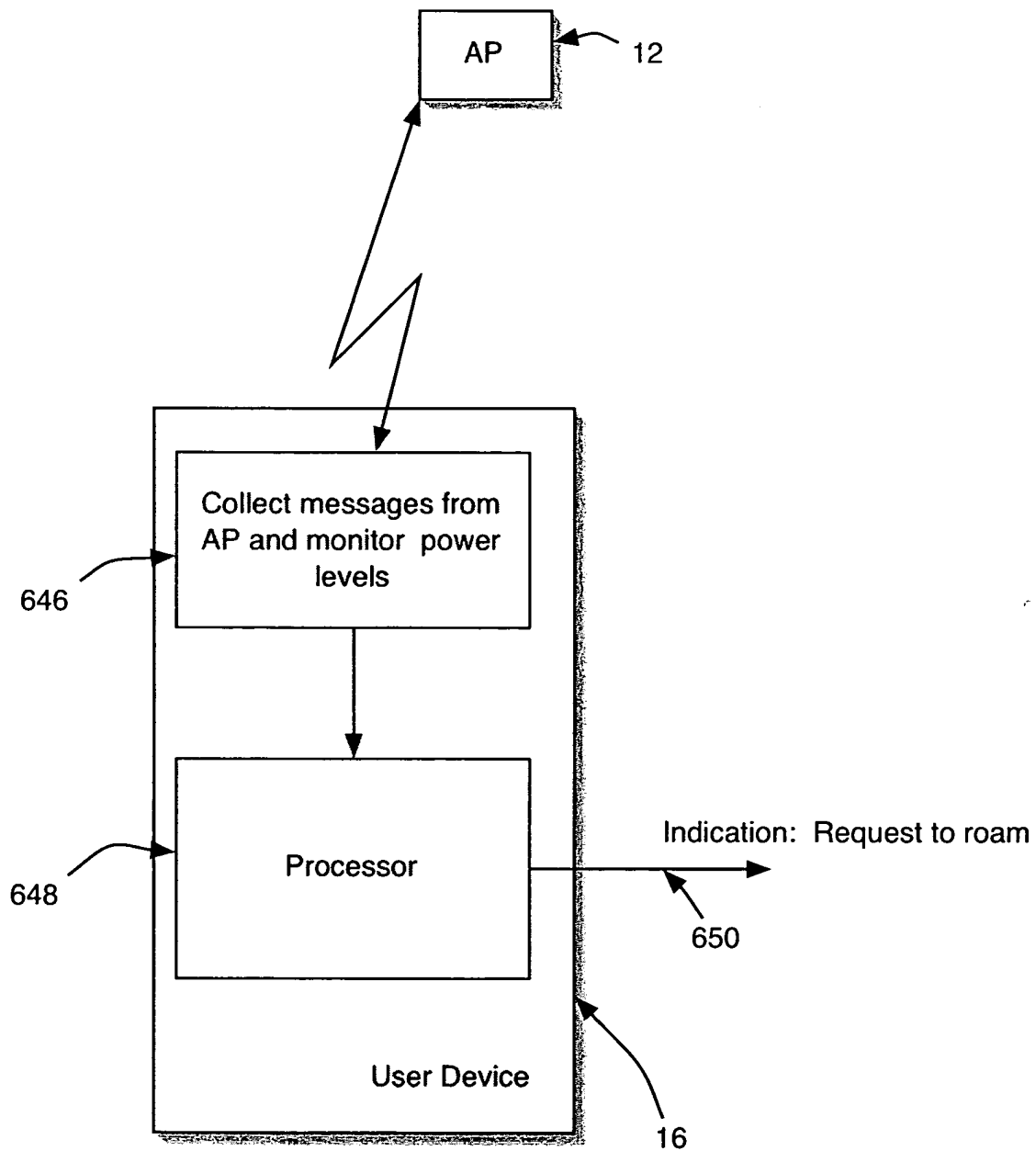


Fig. 57

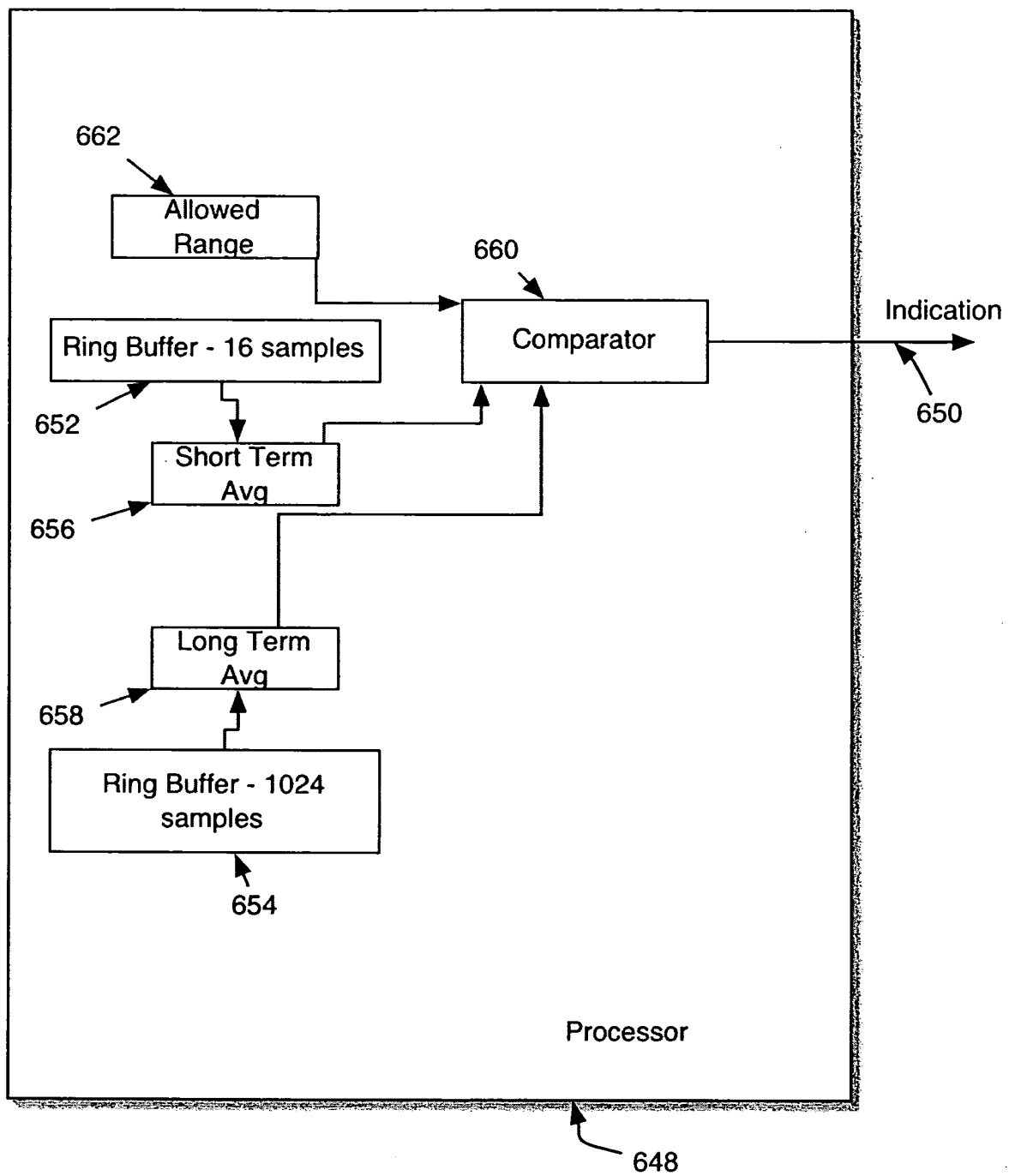


Fig. 58

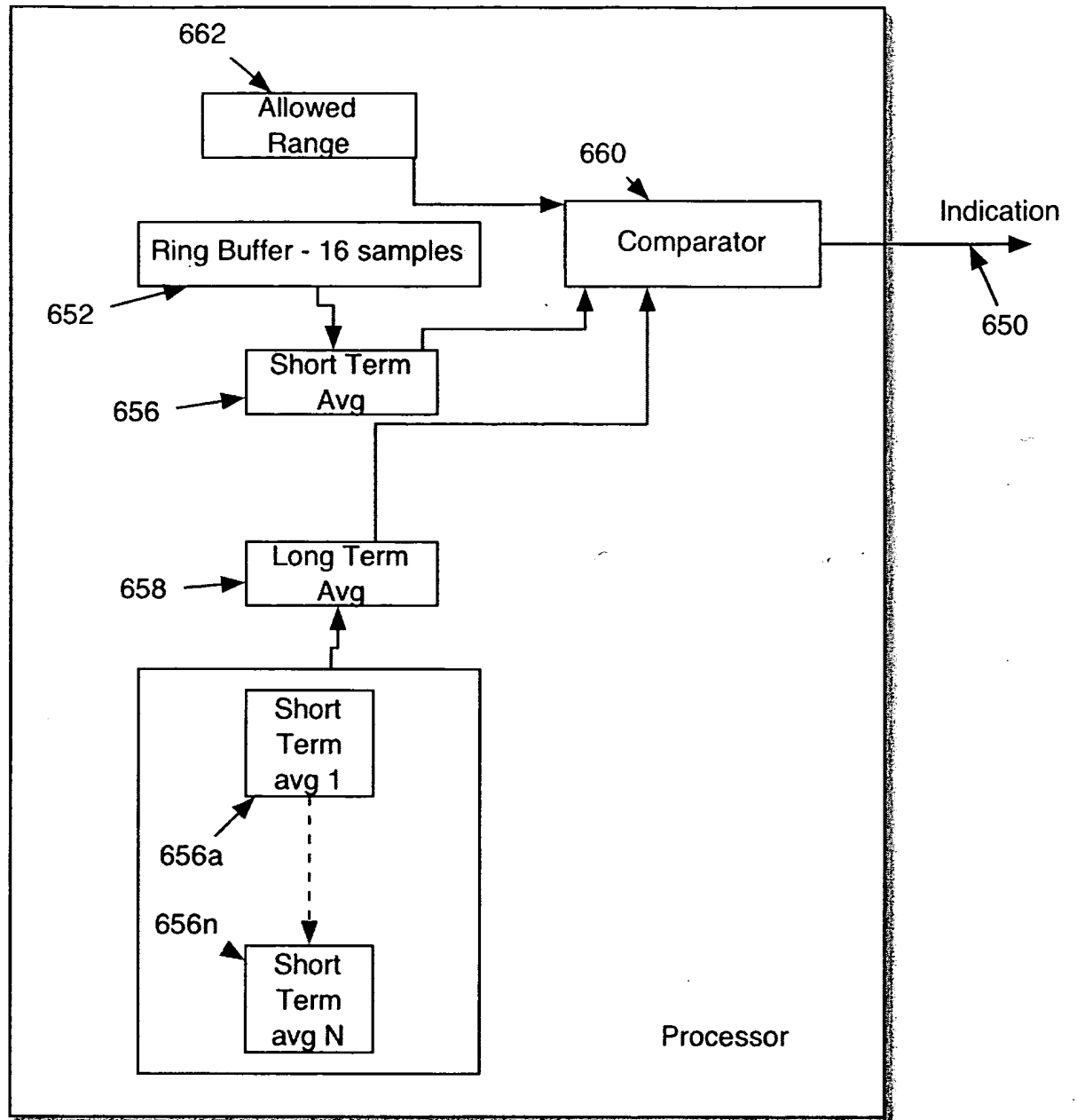


Fig. 59